Compact disc player CD371/00R/05R/30R/35R

Service
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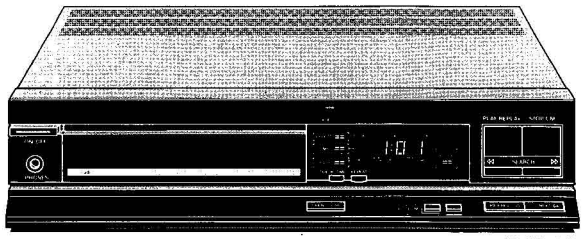

Service Manual

COMPACT disc DIGITAL AUDIO

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2 Controls and technical specifications
3 Servicing hints
4 Measurements and adjustments
5 Exploded views and parts lists of mechanical components
6 Block diagram, circuit diagrams, PCB data, parts lists of electrical components and wiring diagram
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8 Additional information

For repair of the CD mechanism refer to Service Manual CDM-2, version 0500.

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

CLASS 1 LASER PRODUCT

3122 110 03420

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COMPACT disc DIGITAL AUDIO

1. EXPLANATION ON THE LAYOUT OF THE DOCUMENTATION

The documentation consists of chapters.
The number of the chapter is indicated by the first digit of the page number.
The second digit of the page number is the sequence numbering.

If modifications or supplements require new supplementary or replacement pages, the page number is extended with a third part:

A digit behind the page number indicates that it concerns a supplementary page.
A replacement page is indicated by a letter behind the page number.

Example

3-6	is page 6 of chapter 3
3-6-1	is a supplementary page behind page 3-6
3-6-a	is the replacement page of page 3-6 (so page 3-6 can be removed from the documentation).

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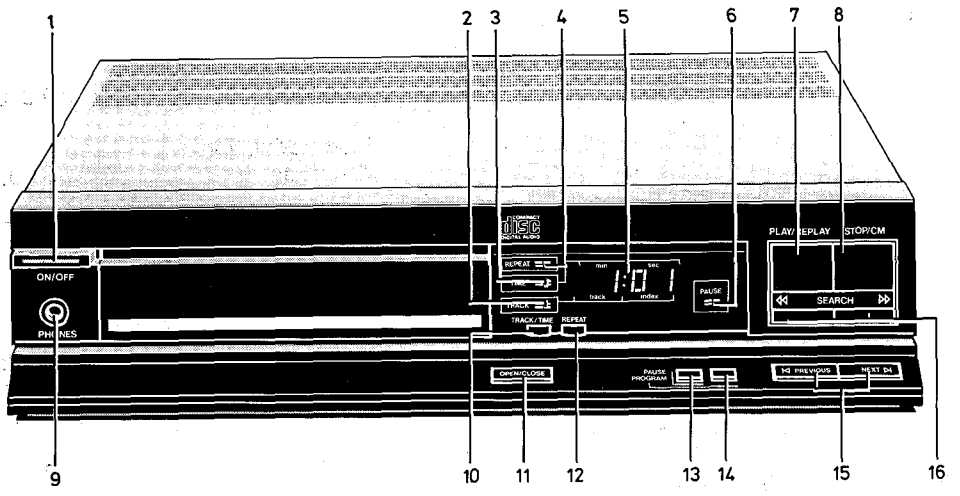

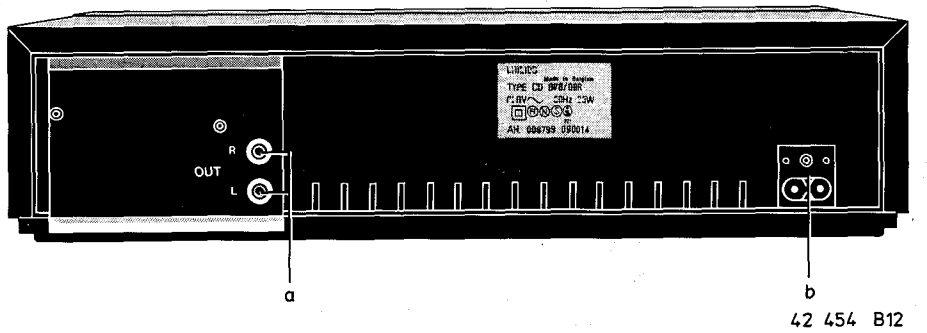

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2. CONTROLS

1 "ON/OFF" key: for switching the player on and off.
2 Track Led: lights during display of track numbers.
3 Time Led: lights during display of playing time.
4 Repeat Led: lights when you press the "REPEAT" key.
5 Display: functions as on/off indicator; gives information about the number of tracks on the disc, the playing time, the progress of play and particular functions of the player, and signals any faults occurring during operation or programming.
6 Pause Led lights when you press the "PAUSE" key.
7 "PLAY/REPLAY" key: for starting play ("PLAY") and returning to the beginning of a track ("REPLAY").
8 "STOP/CM" key: for stopping play during playback ("STOP") and for erasing a programme (CM = Clear Memory).
9 "PHONES" socket: for the connection of a headphone for listening to discs without using an amplifier.
10 "TRACK/TIME" key: for switching from track number to playing time indication and vice-versa.
11 "OPEN/CLOSE" key: for opening and closing the disc tray.
12 "REPEAT" key: for repeating a disc or a programme.
13 "PAUSE" key: for holding play at the start of a track or passage and for interrupting play.
14 "PROGRAM" key: for storing the track numbers of a programme and producing the display of the programme stored.
15 "PREVIOUS/NEXT" keys: for indicating the track number you want to begin with, and selecting track numbers when compiling a programme (◁ from high to low and ▷ from low to high); also for returning to a previous track number or moving on to a later one during play.
16 "◁◁ SEARCH ▷▷" keys: for fast search to a particular passage (◁◁ backwards, ▷▷ forwards).

a. Out: for the signal output cable to the amplifier.
b. Connections for the mains lead.

TECHNICAL SPECIFICATION

- System : Compact Disc Digital Audio system
- Mainsvoltages : 110 V, 127 V, 220 V, 240 V ± 10% (to be changed by transformer connections)
- Mains frequencies : 50-60 Hz (no adaption required)
- Power consumption : 14 W
- Frequency range : 2 Hz + 20 kHz ± 0,05 dB
- Output voltage : max. 2 V_{rms}/≥10 kOhms
- Output impedance : 200 Ohms
- S/N ratio : ≥96 dB
- Chanell separation : ≥93 dB
- Total harmonic distortion : ≤0,003% (-90 dB)
- Intermodulation distortion : ≤0,003% (-90 dB)
- De-emphasis : 0 or 15/50 µs (switched by the subcode on the disc)
- Dimensions wxhxd : 360 x 300 x 80 mm (tray closed) 360 x 425 x 80 mm (tray opened)
- Weight : approx. 2.9 kg
- Headphone
  - Output voltage : max. 5.6 Vrms
  - Output impedance : 150 Ω
  - Load impedance range : 8 Ω - 2 kΩ
  - Output power : 30 mW at 32 Ω

SERVICE AIDS

Audio test disc	4822 397 30085
Disc without errors + disc with DO errors, black spots and fingerprints	4822 397 30096
Torx screwdrivers	
Set (straight)	4822 395 50145
Set (square)	4822 395 50132
13th order filter	4822 395 30204
Service cable (4-pole)	4822 321 21284
Service cable (14-pole)	4822 322 40066
Service connector (14-pole)	4822 267 50676
Green LED CQYG II	5322 130 32182

3. SERVICING HINTS

ESD

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

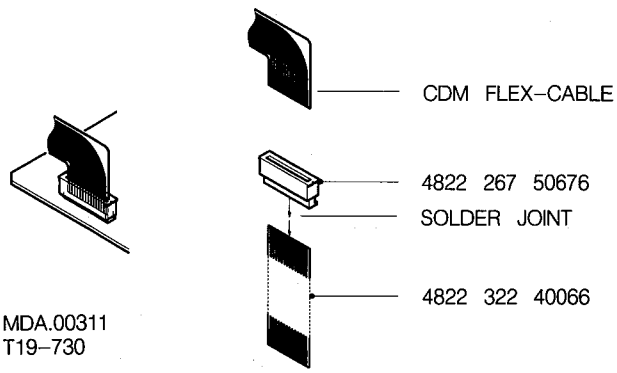
The disc should always rest properly on the turntable.
To achieve this a disc hold-down has been mounted in the cover.
When the cover has to be taken from the set for repair, a separate hold down should be used.
Switch SK2 has to be interconnected.
The set can be used normally.

In the set chip components have been applied.
For disassembly and assembly of chip components see the figure below.
For measurements and adjustments it is possible to position the working mechanism outside the set.
To do this work the following service aids are available:
- Service cable (4-pole 4822 321 21284
- Service flat cable (14-pole) 4822 322 40066
- Service connector (14-pole) 4822 267 50676

These two items should be used to assemble an extension calbe between connector 11 and the flex cable of the CDM-2 unit.

Remark: The service cable should be assembled as follows (see drawing MDA 00311).

The 14-pole connector should be soldered as indicated in the drawing. Please remove the blue tape of the rear of the service flat cable-end which has to be connected to connector 11.



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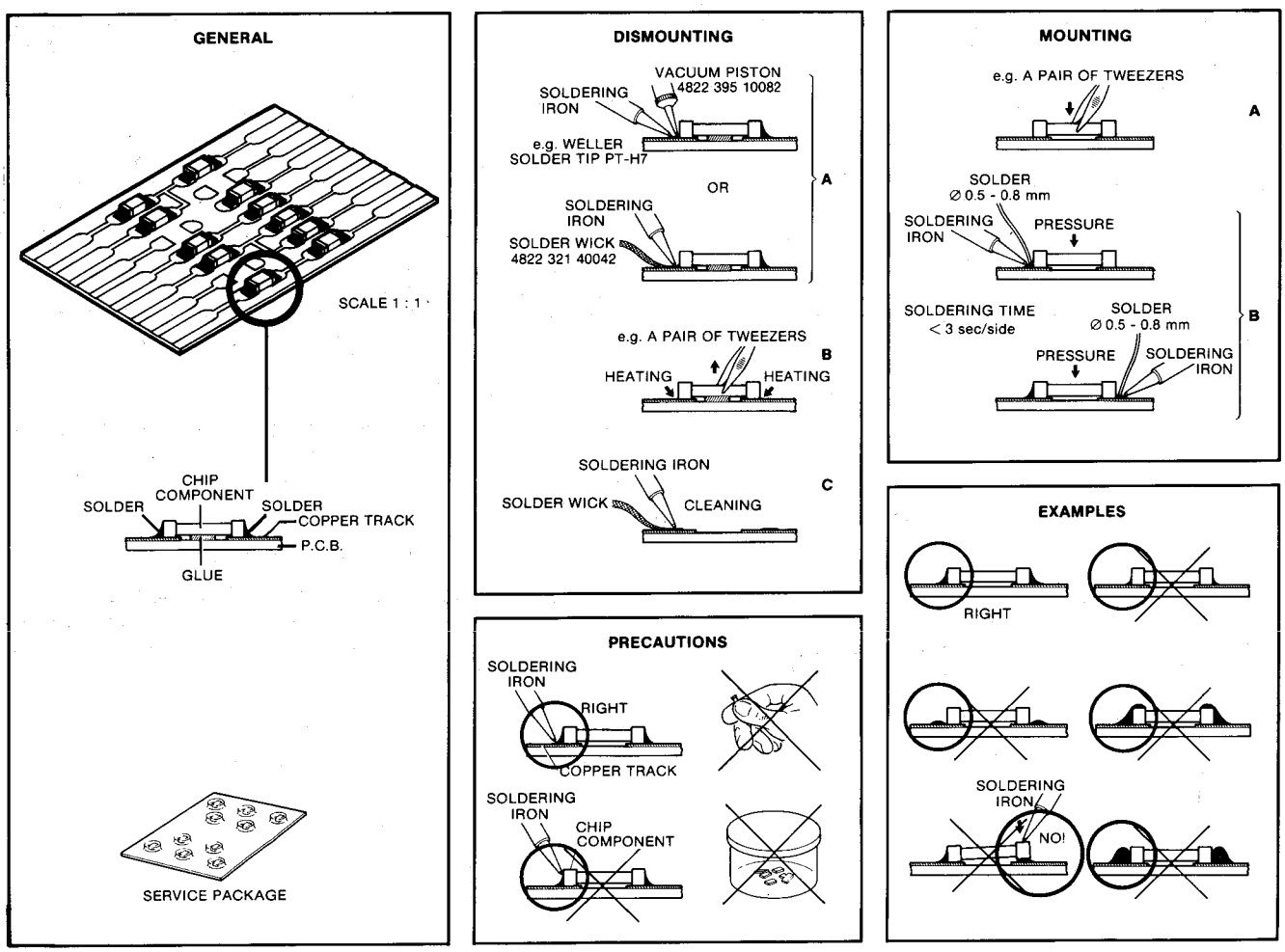

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Fig. 1

DISASSEMBLY OF TOP COVER

- Remove the 4 screws out of side walls of top cover.
- Take top cover from set.

SERVICING OF THE FRONT PANEL

Disassembly of front panel

- Remove top cover.
- Remove the 3 fixing screws at upper side of front panel.
- Now the front panel can be taken off.
- Ensure during mounting that the 3 bosses of the set frame engage with the appropriate holes of the frontpanel.

Disassembly of control + display panel

- The control and display PCB can be detached by removing the 4 screws 3Mx16 at the bottom of the display panel.
- Then the control + display panel can be taken out of the front.
- When mounting, make sure that the 2 bosses on the PCB slip into the appropriate holes in the front.

SERVICING OF THE TRAY MECHANISM

- Demounting the tray mechanism.
- Remove the top cover.
- Remove the front.
- Remove the tray out of the mechanism.
- Remove the screw from the bottom of the set.
- Undo the 3 screws with which the loading has been mounted into the set. Two screws are situated in front and one in the centre at the rear.
- Lift the tray mechanism a little and undo the flexible PCB from the connector by lifting the upper part of the connector and taking the flexible PCB out. Short circuit the connections by means of a paperclip.
- Undo the 2 stocko connectors.
- Now take the tray mechanism out of the set.

DEMOUNTING THE CDM

- Remove the complete disk hold-down.
- Turn the loading upside down.
- Support the CDM.
- Loosen the 2 screws on the metal bracket with which the CDM is suspended.
- The CDM can now be removed.
- For servicing the CDM see Service Manual CDM2/0500.
- Mounting is done in reverse order.

SERVICING THE SERVO + DECODER PANEL

- Remove top cover.
- Remove the front panel.
- Remove the tray mechanism.
- Remove the screw with which the chassis part is fixed.
- Remove the screw in the rear with which the CINCH sockets are fixed.
- Remove the screws on the PCB.
- Remove the screws from the transformer.
- The PCB now can be taken out.
- Mounting is done in reverse order.

REPLACEMENT OF TRANSFORMER FUSE

- For replacing the transformer fuse the transformer must be desoldered from the main panel.

4. ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

HINTS

Test disc

It is important to treat the test discs with great care. The disorders on the discs (black spots, fingerprints, etc.) are exclusive and unambiguously positioned. Damage may cause additional drop-outs, etc. rendering the intentional errors no longer exclusive. In that case it will no longer be possible to check e.g. the good working of the track detectors.

Measurements on op-amps

In the electronic circuit op-amps have been used frequently. Some of the applications are amplifiers, filters, inverters and buffers.

In those cases where in one way or the other, feedback has been applied the voltage difference at the differential inputs converges to zero. This applies to both DC and AC signals. The cause can be traced to the properties of an ideal op-amp ($Z_i = \infty$, $G = \infty$, $Z_o = 0$). If one input of an op-amp is directly connected to ground it will be virtually impossible to measure at the inverting and the non-inverting inputs. In such cases only the output signal will be measurable.

That is why in most cases the AC voltages at the inputs will not be given. The DC voltages at the inputs are equal.

Simulation with "0" and "1"

During troubleshooting sometimes certain points should be connected to ground or supply voltage. As a result certain circuit can be brought in a desired state thus shortening the diagnosis time. In a number of cases the related points are outputs of op-amps. These outputs are short-circuit-resistant, i.e. they can be brought to "0" or ground without problems.
The output of an op-amp, however, should never be connected directly to the power supply voltage.

Measurements on microprocessors

Inputs and outputs of microprocessors should **never** be connected directly to the power supply voltage. The inputs and outputs should only be brought to "0" or ground if this is stated explicity.

Measurements with an oscilloscope

During measurements with an oscilloscope it is recommended to measure with a 1:10 test probe, since a 1:10 probe has a considerably smaller input capacitance than a 1:1 probe.

Selection of ground potential

It is very important to select a ground point that is as close as possible to the test point.

Conditions for injection

- Injection of levels or signals from an **external** source should **never** take place if the related circuit has no supply voltage.
  The injected levels or signals should never be greater than the supply voltage of the related circuit.

GENERAL CHECKPOINTS

In the detailed measuring method below a number of general conditions, required for a properly functioning set, will not be mentioned. Before the detailed measuring method is started, these general points should first be checked.

a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and work with undamaged discs.
b. Check if all supply voltages are present and if they have the correct values.
c. Check the good working of the CD mechanism by means of the servicing programme.

Indication of test points

In the drawings of the diagrams and the panels the test points have been indicated by a number (e.g. ◇12◇) to which the measuring method refers. In the measuring method below, the symbol (◇) has been omitted for the testpoints indicated.

Initialization of the service program of the µP

- **Servicing position "0"**

  Press the STOP/CM, NEXT and PAUSE keys. Keep these three keys depressed while switching on the mains voltage. This is the 1st standby position. The number of the internal ROM program of the µP (e.g. P101) appears on the display. The "TRACK" Led lights up as well. In this position the radial arm of the CDM can be driven inwards (with SEARCH≫) and outwards (with ≪SEARCH) with minimum torque. When one of these search keys is actuated, laser control and focus control become active as well. If a disc is put on the turntable, the working of the focus control can already be observed in this position. (If the arm moves outwards and inwards, you can hear the optical pick-up unit jump across the tracks).
  Attention: After one of these keys (SEARCH ≫, ≪SEARCH) is pressed, the laser remains controlled up to service position 3.
  Avoid, therefore, direct exposure to the laser beam in service positions 0, 1 and 2).

- **Servicing position "1"**

  From service position "0" the player can be brought into service position "1" by pressing the "NEXT" key. The indication "0001" appears on the display. In this position the focus start procedure is repeated over and over again. The laser control is active.
  However, this start procedure does not release the focus control. So we cannot ascertain that the focal point is found. This position is very suitable, however, for measurements of the focus circuit.
  In service positions 1 and 2 the arm with the rafoc unit can be moved inwards and outwards with the SEARCH≪ key and the ≫SEARCH key respectively. In this way the free movement of the arm under the disc can be checked.

  sturen. Daarmee kan de vrije beweging van de arm onder de plaat worden gekontroleerd.

- **Service position "2"**

  To be attained by pressing the "NEXT" key after service position "1" is reached. The indication "0002" appears on the display. Make sure that the rafoc unit is within the reach of the disc. If a disc is put on the turntable in this position, the working of the decoder (MC signal) and the turntable motor control can be checked (turntable motor is running at the right speed). Laser control, focus control and turntable motor control are active. This position is very suitable for measurements of the turntable motor control. If the HF signal is not well coded or if no disc is present, the turntable motor will start rotating at maximum speed.

- **Service position "3"**

  To be attained by pressing the "NEXT" key after service position "2" is reached. The indication "0003" appears briefly on the display. Then the normal standby display is shown. the set is now in the 2nd standby position. All keys have their original function again. In case of deviations an extensive error indication takes place via the display.
- If the µP observes a system error, a system error indication will appear on the display: Er 01 to Er 08.
- If the µP observes an operating error, an operating error indication will appear on the display for 1.5 sec.: Er 30 to Er 37 and Er 60 to Er 61.
  For an explanation of the error indications: See Error table.

  The service program can be abandoned by turning the mains switch (POWER ON/OFF) off and on again (Hardware reset).

ERROR TABLE

Er 01: RD pulse is missing. Check the start capacity Sc, the RD signal and the photodiode signal processor. (Starting error)
Er 02: $\overline{TL}$ pulse is missing during start-up. Check the $\overline{TL}$ signal, the HF-signal and the Photodiode signal processor. (Starting error)
Er 03: Lead-in track not found. Check the disc used. Check also that the radial arm rests against the inside. Check the RE-dig signal and the Radial error processor. (Starting error)
Er 04: Too many $\overline{TL}$ pulses during play. Check the quality of the disc used. Check the HFD signal. (Error during PLAY)
Er 05: $\overline{TL}$ pulse is low for more than 50 msec. Check the disc used. Check the HF-in signal and the photodiodes (Error during PLAY).
Er 06: No $\overline{TL}$ pulse received within 0.5 sec. during track jumping. Check the RE-lag circuit. (Error during SEARCH or NEXT/PREVIOUS)
Er 07: Subcode error. In case of track loss during play the information of the subcode is used to determine the place of the last information that was still well readable. In case of an interruption of HF or other signals, this will lead to Er 07. (Error during PLAY)
Er 08: TOC error (Table of Contents). Check the quality of the disc used. Check the initial speed of the turntable motor and the motor control. Check also that the radial arm rests against the inside. (Starting error)

Temporary errors

Er 30: NEXT when repeat is off.
Er 31: PREVIOUS when repeat is off.
Er 32: INDEX selected when no track selected.
Er 33: Selected index does not exist on this CD.
Er 34: Review error: no program.
Er 35: Program memory full.
Er 36: Programmed track is non existing on this CD.
Er 37: Selected track is non existing on this CD.
Er 60: Fast forward bound.
Er 61: Fast reverse bound.

Specification measurement

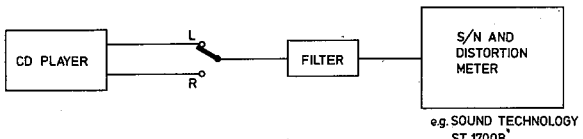


Fig. 4

To measure the specification use can be made of audio test disc 4822 397 30095.
Use 13th order filter 4822 395 30204 to measure (see Fig.4):
- Total harmonic distortion (THD)
- Intermodulation distortion
- Signal-to-noise ratio (S/N)

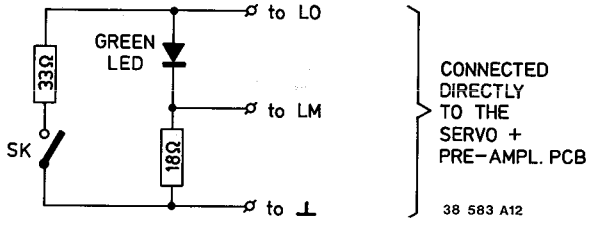
Continuous burning of the laser see:
Initiation of the servicing programme, service position "0".

***Note:* Danger**

Invisible laser radiation.
Avoid direct exposure to beam.

Check of the laser supply

The laser and, the laser supply in IC6525 plus the monitor diode form a feedback system.
A defect in the laser supply can result in the destruction of the laser.
If, in that case, the laser (= complete CDM2 unit) is replaced, the new laser will also become defective.
However, it is impossible to check and repair a feedback system if a link is missing. The laser supply can be checked with the circuit below. The green LED replaces the laser, the voltage across the 18 Ohm resistor is feed back as monitor voltage, the 33 Ohm resistor and the switch serve to draw more current from the laser supply.



LED GREEN e.g. CQY 94 IV 5322 130 32182

The above circuit is connected to the connector on the main panel via an extension cable instead of a flex print. The normal flex print is not suited for this purpose because of its high internal resistance.

Code no. extension cable 4822 322 40066

- Take the above flex print out of the connector on the main panel.
- Connect the circuit via the extension cable to the connector.
- Select the play mode by grounding $\overline{Si}$ (pin 20 of IC6525).
  Note: $\overline{Si}$ = 0, start initialisation low, is the play mode.
- Measure the voltage LO (Laser Out) at test point 9.

SK open: 1,8 V ⩽ LO ⩽ 2,3 V
170 Mv ⩽ LM ⩽ 220 mV
The green LED emits little light.

SK closed: 1,8 V ⩽ LO ⩽ 2,3 V
170 Mv ⩽ LM ⩽ 220 mV
The green LED emits little light.

- During the change over from SK closed to SK open, the LED will emit more light for a short moment.
- The control sees to it that the same amount of current flows through the LED when SK is open and when SK is closed.

At $\overline{Si}$ = 1, in the STAND-BY state, LO = 0 V ± 0,2 V.

Repair procedure

Since laser, monitor diode and photodiodes are very sensitive to static charges, care should be taken that during measurements and adjustments the aids and yourself have a potential that is equal to that of the CD mechanism.

Attention: When exchanging the CDM2 unit, the laser output potentiometer 3528 should be placed in mechanical mid-position to avoid damage to the laser.

Adjusting the laser current.

Coarse adjustment

- Place potentiometer 3528 approximately in mid-position.
- Put test disc 5 on the turntable.
- Bring the player in service position 3, position Play.
- The focusing motor can now start focusing and when it has found the focal point index "01" will appear on the display.
- If this does not happen, turn potentiometer 3528 clockwise or anti-clockwise a little and press the playbutton again.
  Here after the fine adjustment of the laser current has to be carried out.

Fine adjustment

- Play track 1 of the test disc 5.
- Adjust potentiometer for a voltage across 3508 test point 1 and 2 of 50 mV ± 5 mV.

Adjustment of the focus off-set

Coarse adjustment

Adjust the focussing motor to the eye for a horizontal position by means of potentiometer 3517.
- Here after the fine adjustment of the focus off-set has to be carried out.

Fine adjustment

- Bring the player in service position 2.
- Adjust potentiometer 3517 for a voltage across 2545 (test point 27) of 400 mV ± 40 mV.

Note: Notice that the CDM is in a horizontal position.

Changing the transformer connections

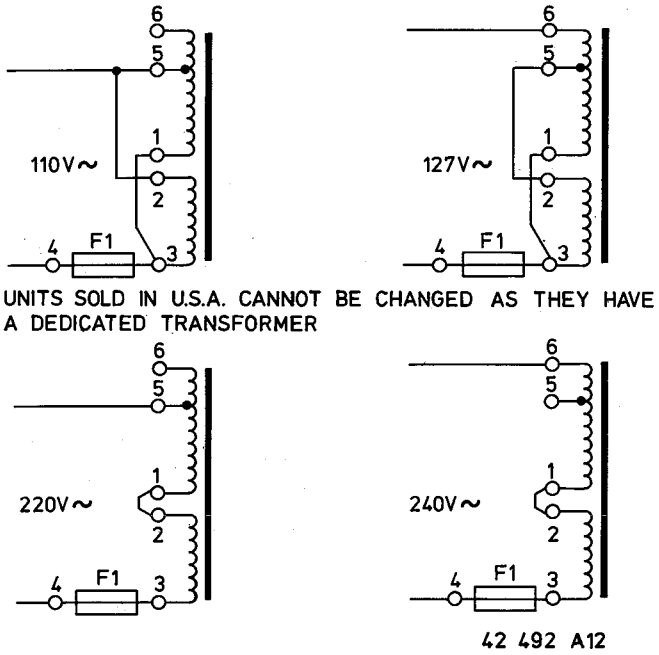


Fig. 6

If the set should be connected to a mains voltage that deviates from the voltage mentioned on the type plate, the transformer connections should be changed, as indicated in Fig. 6.

DETAILED MEASURING METHOD

I. µP IC6551

- **Servicing program**

  For initiation of the servicing program see: General checkpoint: Initiation of the service program.

- **Reset (pin 1, testpoint 14)**

  When the supply voltage is switched on, a positive pulse should be present.

- **X-tal out (pin 39; test point 13)**

  The frequency of this signal should be 6 MHz.

- **$\overline{\text{MSTP}}$ (pin 26; test point 78)**

  When, after RD "high", the $\overline{\text{MSTP}}$ is "high" for a short moment (> 0.2 sec.), the turntable motor control will be switched on.
  The turntable motor is controlled by the MC-signal (test point 12).
  To check MC, see: "Decoder A IC". To check the turntable motor control see CDM2 Service Manual "Checking of the motor control".

- **B0 (pin 11; test point 36)**
  B1 (pin 10; test point 34)
  B2 (pin 9 ; test point 33)
  B3 (pin 8 ; test point 32)

With the B0 + B3 signals
- The radial control is switched on.
- The level on the DAC output is controlled.
- In the SEARCH mode, there should be activity on all 4 test points.
- In the following positions the signals B0 ÷ B3 are stable:

signal	STOP	PLAY	Service pos. 0,1,2	Service pos. 3 pos. Play
B0	"low"	"high"	"low"	"high"
B1	"high"	"high"	"high"	"high"
B2	"high"	"high"	"high"	"high"
B3	"low"	"low"	"low"	"low"

- **$\overline{\text{TL}}$ (pin 34; test point 16)**

- The $\overline{\text{TL}}$ signal (Track Lost) is used to tell the µP that track loss threatens. The µP then can give correction signals with B0 ÷ B3.
- In the "SEARCH" mode, or when the player is bumped against, there are pulses on test point 16.

- **REdig (pin 7; test point 37)**

  The REdig signal (= Radial Error Digital = radial deviation) is used to determine the place of the arm relative to the track and to check/corect in case of track jumping or bumping against the player.

  In servicing position 3 position Play or in the PLAY mode, a square wave should be present on test point 37.
  Because of frequency variations, this square wave is hard to trigger.

- **$\overline{\text{DODS}}$ (pin 5; test point 19)**

  The $\overline{\text{DODS}}$ signal (= Drop Out Detector Suppression) avoids that Drop-Out signals influence the arm control during track jumping.

POSITION PLAYER	POWER ON	SERVICE POSITION 3	PLAY	SEARCH, PAUSE
$\overline{\text{DODS}}$ SIGNAL	"LOW"	"HIGH"	"HIGH"	

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II. PHOTODIODE SIGNAL PROCESSOR IC6525

- **SC (pin 25, testpoint 20)**
  SC (= Start Capacitor)

High Ohmic measurement

Position of player	SC (pin 25)
POWER ON	−4 V
PLAY	+5 V
Servicing pos. 1	+5 V

- **$\overline{Si}$ (pin 20; test point 21)**
  LO (pin 17; test point 9, 9^A, 9^B)

- With the $\overline{Si}$ signal (= Start Initialization) the laser supply, among other things, is switched on.
  When the $\overline{Si}$ signal is "low", the LO signal (= Laser Out) should be "high".
  Via the LM signal (= Laser Monitor) the power supply for the laser diode is controlled.

Position of player	POWER ON	Servicing pos. 1*)	PLAY
$\overline{Si}$ signal	"high"	"low"	"low"
LO signal	"low"	"high"	"high"

- **LM (pin 16; test point 11) to check LM**
  See general checkpoints 'check of the laser supply'
- **To check the laser supply,** see General checkpoints "Check of the Laser Supply".
- **To check the focus offset,** see General checkpoints "Adjustment of the Focus Offset".

*) To ensure that the player stays in servicing position 1, there should be a disc on the turntable.

- **FE pin (pin 5; test point 26)**

- The FE signal (= Focus Error) is used to drive the focusing unit.
  When the $\overline{Si}$ signal goes to "high", the focal point will be searched for.

- When the player is brought into servicing position 1, the objective will keep repeating the focus start procedure.
  At test point 26 the FE signal varies between +1,5 V and −1,3 V.

worden gezocht.

- **RD signal (pin 21; test point 24)**

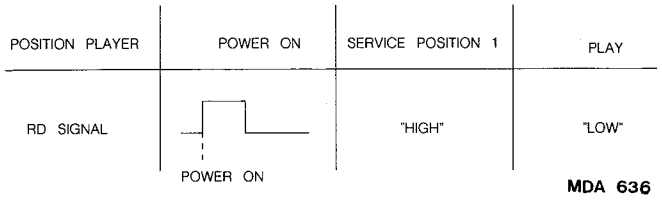
HIGH-OHMIC MEASUREMENT

The RD signal (= Ready) will go high when the starting procedure of IC6525 has been completed.

- **RD (pen 21; testpunt 24)**

Het RD-signaal wordt "hoog" wanneer de opstart procedure van IC6525 voltooid is.

(Hoogohmig meten)



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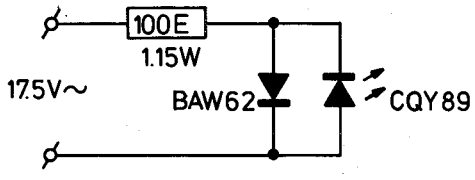
- **D1 (pin 9 ; test point 4)**
  D2 (pin 10; test point 6)
  D3 (pin 8 ; test point 7)
  D4 (pin 7 ; test point 8)

- The signals D1÷D4 are the error signals from the photodetector circuits.
- When in servicing position 2 the disc is moved, the focusing unit should keep in track.
  When the disc is moving, there should be a changing signal on test points 4, 6, 7 and 8.

Check of the photodetector.
Connected the circuit below to an alternating voltage of 17,5 V.



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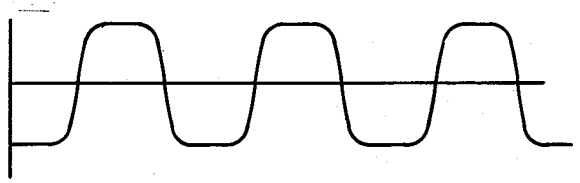
100 E-1.5 W - 4822 116 51098
BAW 62 - 4822 130 30613
CQY 89 - 4822 130 31332

Switch on the supply voltage and bring the player in the stand-by mode or in serciving position 0.
In this measurement, infrared diode CQY89 replaces the function of the laser diode.
When this diode is held above the objective unit, the infrared light falls on the 4 photodiodes.
When the 4 photodiodes are functioning, the following voltage form will be visible on test point 4, 6, 7 and 8.
(The amplitude depends on the distance between the IR diode and the objective).



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Position of the oscilloscope: 100 ms/div.

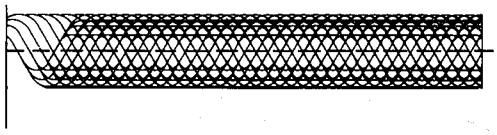
- **HF-in (pin 3, test point 3)**

- The HF-signal (= High Frequency in) is the information signal from the 4 photodiodes.

- **HF-out (pin 27; test point 17)**

- The HF-out signal (= High Frequency) is the amplified information signal for the decoder circuit.
  During playback of test disc no. 5 (4822 897 30096), a so-called "eye pattern" should be present on test point 17 (see figure below).
- The HF signal should be present and stable in the PLAY mode.

staat PLAY.



Position of the oscilloscope: 0,5 µs/div.
Amplitude about 1,5 V_{pp}

- **DET (pin 26)**
  HFD (pin 19; test point 23)
  TL (pin 18; test point 16)

- The DET signal (= Detector) gives information on the level of the HF signal to the high-frequency. Level-Drop-out detector IC6525.
- When the level of the HF signal is too low, the HFD signal (= High Frequency Detector) will go "low".
- The TL signal (= Track Lost) will then go "low" in order to tell the µP that the tracking signals Re_1 and Re_2 are unreliable.

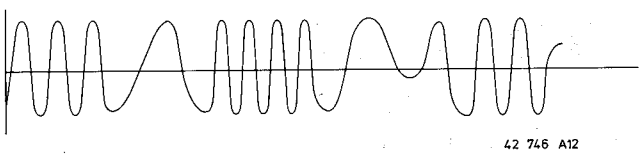
Method:
(Can only be used in a playing set).

- Put test disc 5A 84822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point 23.
  (Position of oscilloscope: 2 ms/div.).

When the disc is slowly braked by hand, TL pulses will be visible at test point 16.

- **RE1 (pin 11; test point 18)**
  RE2 (pin 12; test point 22)

- Signals RE1 and RE2 (Radial Error) are the control signals for the arm during tracking.
- In servicing position 3, position Play the following signals should be visible at test point 18 and 22.



Position of the oscilloscope: 2 ms/div.
The frequency strongly depends on the eccentricity of the disc.

III. RADIAL ERROR PROCESSOR IC6529

- **Check the signals between the µP and the Radial Error and the signals between the photo diode signal processor and the Radial Error Processor.**

- **DAC (pin 10; test point 38)**

  With the DAC signal (= Digital B0÷B3 signal converted into the Analogue signal) the track jumping speed is controlled.
  This signal is derived from the signals B0 ÷ B3 coming from the µP.

- **RE-lag (pin 8; test point 41)**

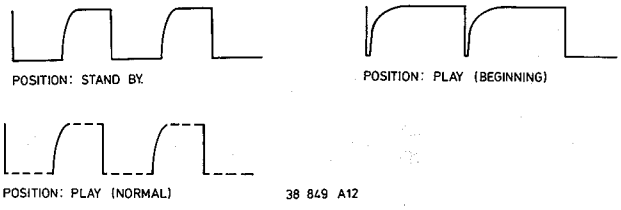
  Capacitor 2559 in the RE-lag circuit has a memory function.
  It memorizes the degree of inclination of the disc.
  When a jump is made to a certain track on the disc, the memory should be cleared.
  This is done by the µP (RPU signal) via transistors 6533, 6534.

  During track jumping (SEARCH), slow pulses should be visible at test point 43 (position of the oscilloscope 0,1 ms/div.)
  In that case pulses should also be visible on the collector of transistor 6533, 6534.

IV. DECODER-A IC

- **Check the MC signal (pin 17; test point 12)**

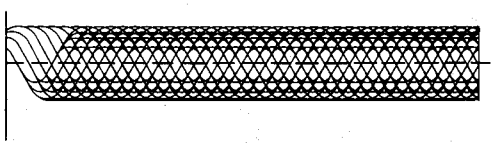
- In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.
- Place a disc on the turntable.
- In position PLAY or SERVICE POSITION 3 position Play the MC signal corresponds to the figure below.



- **Check the HFD-signal on test point 66, pin 26**

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 position Play the HFD-signal is "high"; however, minor pulses may be present and in case of disorders on the disc.
- During playback of track no. 15 of test disc 5A HFD pulses are visible.

Position of the oscilloscope 5 ms/div.



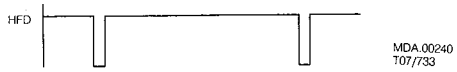
Note:
During start-up the duty cycle is 98%, then the duty cycle of the signal becomes about 50%.

- **VC (connector point 15-1; test point 46)**

- Place a disc on the turntable.
- The voltage at connector point 15-1 during playback will be:
  $V_C = 0 > V_C > -1.7$ V
  To check the turntable motor control, see C.D.M.-2 Service Manual: "Checking of the motor control".

- **Check the HFI signal test point 65 pin 25 (eye pattern)**

- Place a disc on the turntable.
- The HF signal is present and stable in the position Play. See figure below.



● **Check the CEFM signal (pin 27; test point 68)**

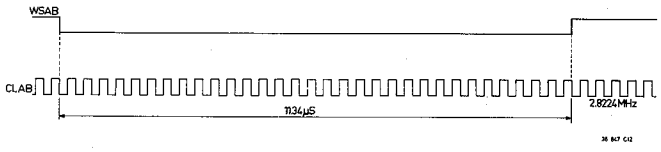
- Place a disc on the turntable.
- In stand-by mode (only the mains switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
- In the position PLAY the frequency is 4.32 MHz.

● **Check the Xin signal (pin 19; test point 69)**

- The Xin frequency is 11.2896 MHz.
- If this frequency deviates, check test point 70; Xout signal, on Filter-B IC.
  This frequency should also be 11.2896 MHz.

● **Check the timing signals meant for Filter-B IC**

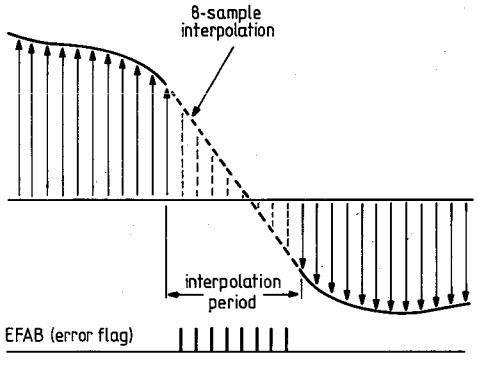
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger the oscilloscope with the WSAB signal (test point 71; pin 39).
- Check signals:
  WSAB at test point 71 (pin 39)
  (Word Select from Decoder-A to Filter-B)
  CLAB at test point 72 (pin 38)
  (Clock from Decoder-A to Filter-B)
  and their interrelation.
- There must be activity a test point 73 (pin 37), DAAB signal (DATA from Decoder-A to Filter-B).



● **Check the EFAB signal (Error Flag from Decocder-A to Filter-B) at test point 74 (pin 36)**

- Place test disc 5A on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- During playback of track no. 17, a EFAB pulse should appear at test point 61 for a short moment.
  The EFAB pulses also appear when the disc is gently slowed down and during fast search (Fast Forward or Fast Reverse).

Note:
Filter-B IC is capable of interpolating linearly 8 successive EFAB pulses.



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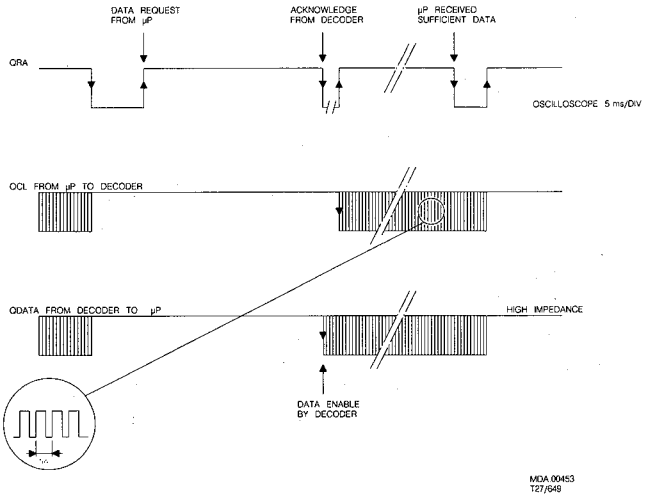
● **Check the Q-channel signals**

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger on the QRA signal (Q-channel Request Acknowledge) test point 75; pin30.
- Check signals: QRA at test point 75 (pin 30)
  QCL a test point 76 (pin 31)
  (Q-channel-clock)
  and their interrelation.
- There should then be activity at test point 77 (pin 29) QDA (Q-channel Data).

Note:
The QRA request is initiated by the µP (QRA "high").
Then Decoder-A answers this request (QRA goes "low").
With the next leading clock pulse (QCL) the QRA signal is rendered "high" again by the µP.
As soon as the µP has taken in enough information via QDA, QRA will go low again. That is why the QRA times vary each time.

Daarom zullen de QRA tijden telkens varieren.



● **Check the $\overline{\text{SSM}}$ signal (test point 78; pin 33) = Start-Stop turntable motor**

- Motor start pulse when test point 78 is "high" for ⩾ 0.2 sec.
- Motor stop pulse when test point 78 is "low" for ⩾ 0.2 sec.

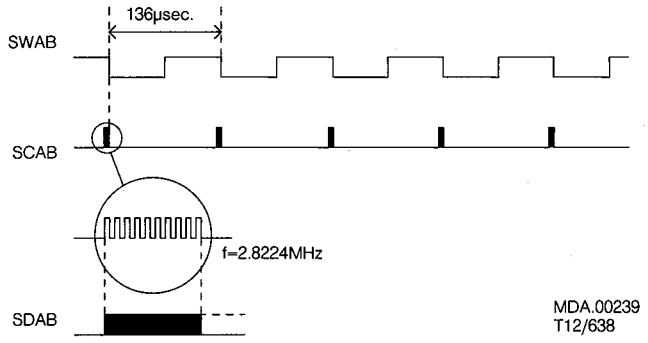
Note:
After the motor start pulse, SWAB information (Subcoding Word clock) will become visible at this point.
The period time of that signal is 136 µsec.

● **Check the subcode clock signals**

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger the oscilloscope with the SWAB signal at test point 78.

- Check the following signals:
  SWAB at test point 78; pin 33
  SCAB at test point 79; pin 35 (Subcode Clock from Decoder-A to Filter-B)
  SDAB at test point 80; pin 34 (Subcode Data from Decoder-A to Filter-B)
  and their interrelations.

Note:
While the burst of 10 clock pulses appear on SCAB the Q-channel information is transferred on SDAB. Hereafter the P-bit indication follows.
The P-bit is "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



● **Check the $\overline{\text{CRI}}$ signal (pin 28)**

The $\overline{\text{CRI}}$ signal is "low" in case of track jumping.
Player in position SEARCH.

● **Check the DEEM signal (test point 84; pin 32)**

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS), the DEEM signal should be "low".
- During playback of track no. 15 (recorded without PRE-EMPHASIS), the DEEM signal should be "high".

V. FILTER-B IC

● **Check the signals between Decoder-A IC and Filter-B IC**

- See sub. "IV. Decoder-A IC":
  * Check the X-tal signal
  * Check the timing signals meant for Filter B (WSAB, CLAB, DAAB signals; test points 71, 72 and 73).
  * Check the EFAB signal (test point 74)
  * Check the subcode clock signals (SWAB, SCAB, SDAB signals; test points 78, 79 and 80).

● **Check the timing signals between Filter-B IC and DAC IC**

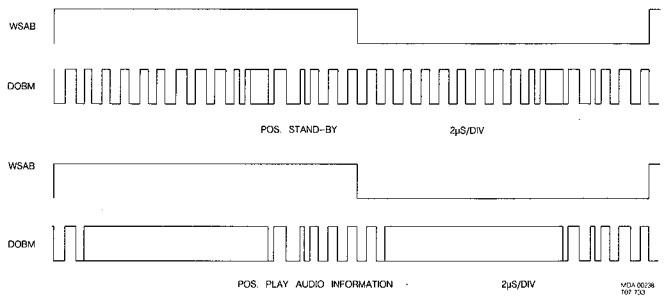
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).

● **Check the following signals:**
WSBD at test point 85; pin 18
CLBD at test point 87; pin 16 (Clock signal from Filter B to DAC)
and their interrelation.
If an Audio Disc is used, there should be activity at test point 86 (pin 15) DABD signal (DATA from Filter B to DAC).
If a disc with Digital Data (CD-ROM) is used, this point is continuously switched "low" by transistor 6562.

● **Check the DOBM signal (Digital Output)**

- Place a disc on the turntable.
- Select the stand-by mode (only mains switch depresed).
- Trigger the oscilloscope with the WSAB signal (test point 71).
- Check the DOBM signal (test point 88; pin 14)
- An empthy audio signal has a fixed pattern. See drawing "Stand-by".
- Select the PLAY mode.
  Check the DOBM signal. See drawing "PLAY".

● **In position SEARCH the $\overline{\text{ATSB}}$ signal is "low" (test point 89; pin 22) (Attenuation Audio Signal)**



● **Check the $\overline{\text{MUSB}}$ signal test point 90; pin 23 ((Soft Mute)**

This signal is "low" in positions:
PAUSE
NEXT or PREVIOUS when jumping from one track to another.
Fast SEARCH when the search button is kept depressed for some time.

VI. DAC IC (Dual Digital Analog Converter)

● **Check the signals between Filter-B IC and DAC IC**

- See sub. "V. Filter-B IC":
  * Check the timing signals between Filter-B IC and DAC IC

● **Check the output of the OP-AMP after the DAC IC**

- Place a disc on the turntable.
- In position PLAY or in SERVICE POSITION 3 position Play, the analog (music) signal should be present at the output of the OP-AMP, after the lead-in track has been read.

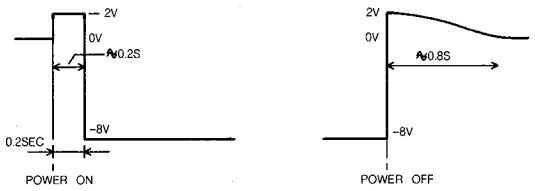
VII. DEEM CIRCUIT

- **Check DEEM circuit**

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS) the DEEM signal at test point 84 should be "low".
- During playback of track no. 15 (recorded with PRE-EMPHASIS) the DEEM signal at test point 84 should be "high".
- During playback of track no. 14 the analogue signal should be present at the source of 6583 (test point 91) and 6582 (test point 92).
- During playback of track no. 15 the analog signal at the source of 6583 (test point 91) and 6582 (test point 92) should be 0 V.

VIII. KILL CIRCUIT

- During switching on and off the mains voltage the signal on the collector of 6580 (to be measured on a jumper, tp93) should be as indicated in the figure below.



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T07/733

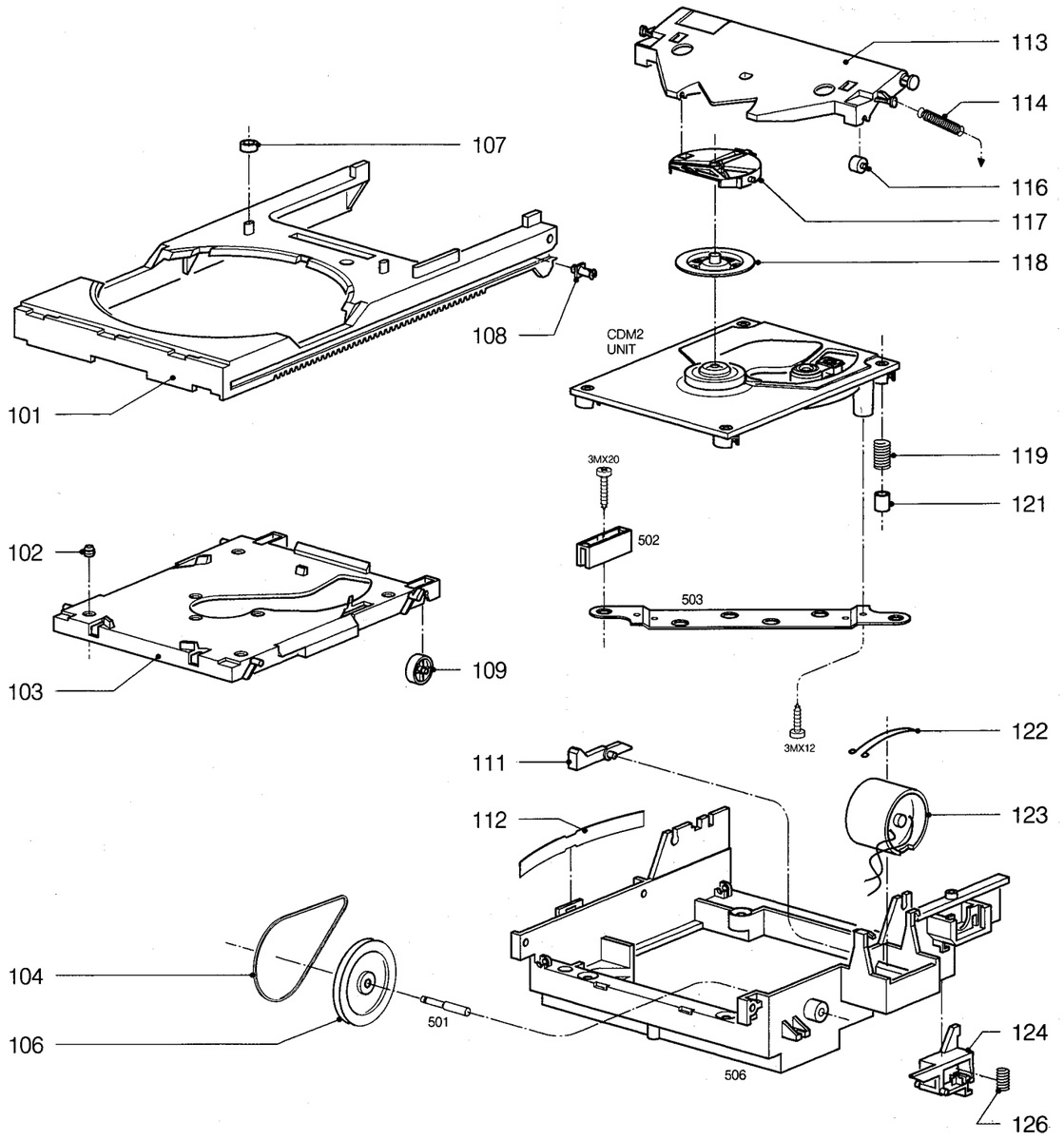
EXPLODED VIEW LOADING

Partslist loading

101	4822 466 92111
102	4822 325 60317
103	4822 444 50582
104	4822 358 10115
106	4822 522 32359
107	4822 532 51756
108	4822 402 61081
109	4822 528 90638
111	4822 402 61107
112	4822 492 63659
113	4822 444 60467
114	4822 492 32762
116	4822 528 90639
117	4822 532 11547
118	4822 462 50383
119	4822 492 51902
121	4822 466 61587
122	4822 492 63746
123	4822 361 20998
124	4822 402 50244
126	4822 492 51935

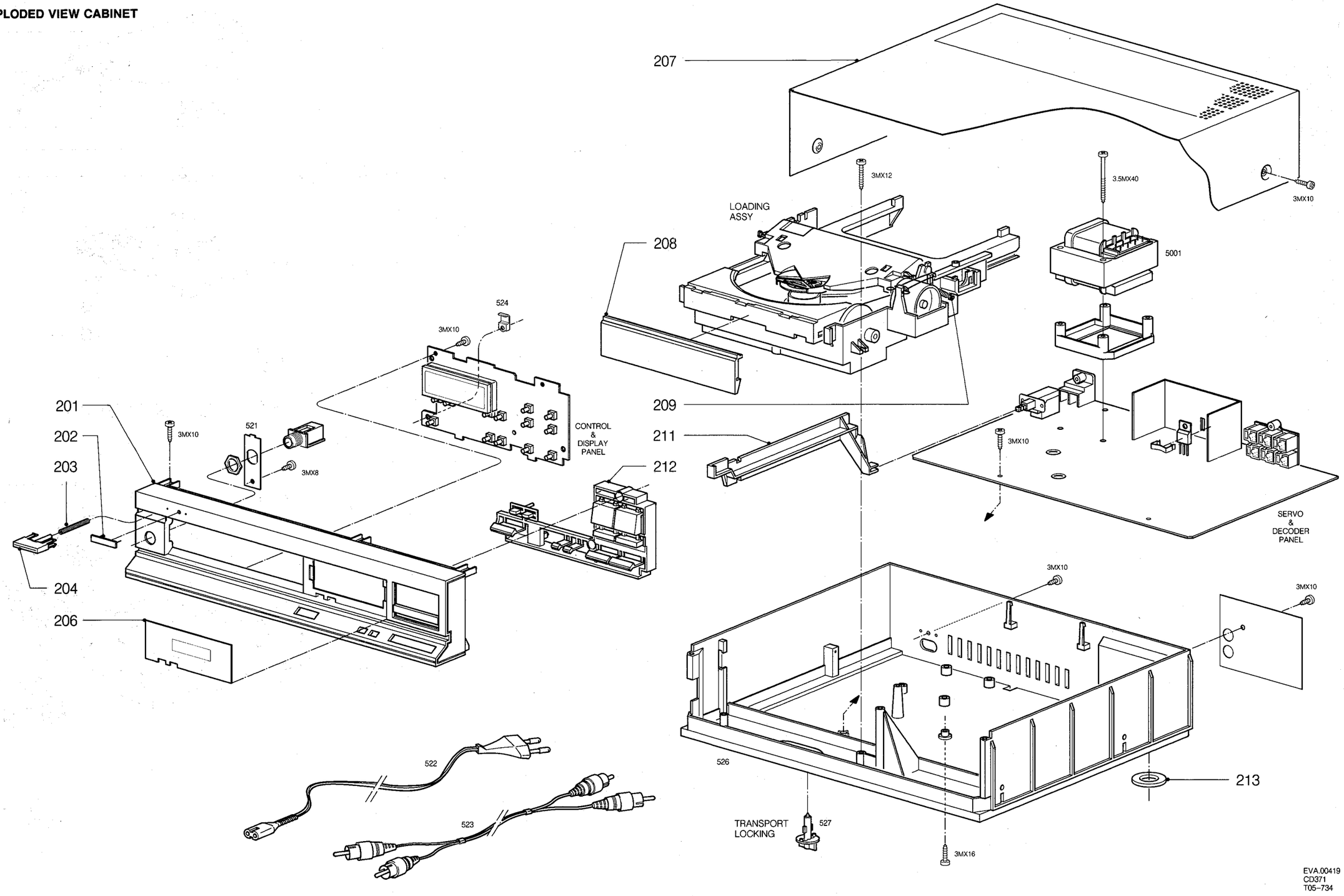
Partslist cabinet

201	4822 444 40208
202	4822 459 10771
203	4822 492 51944
204	4822 410 26055
206	4822 450 61109
207	4822 444 60507
208	4822 444 50589
209	4822 492 32762
211	4822 402 50245
212	4822 410 26056
213	4822 462 40409

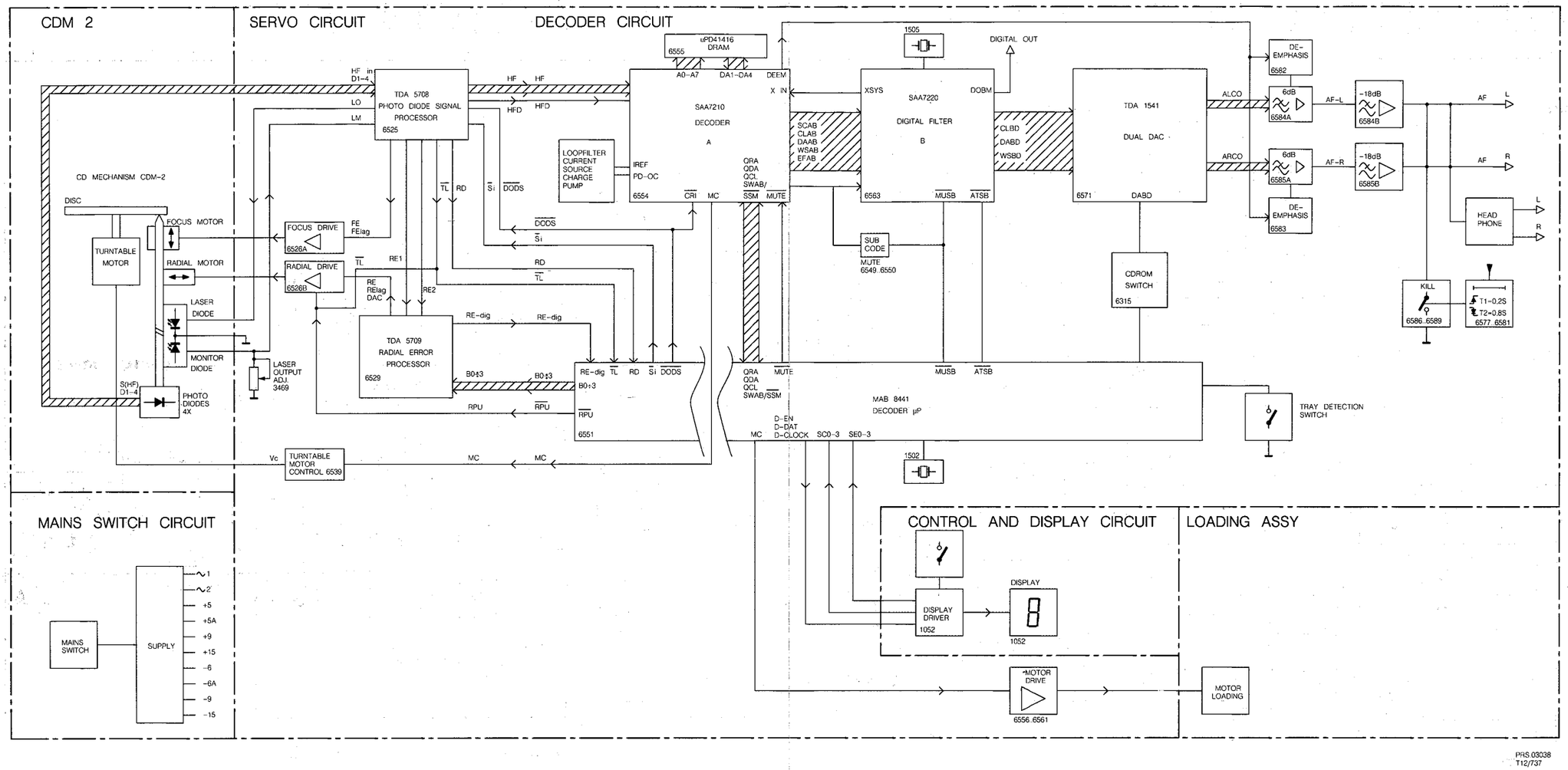


EVA.00365
T07/722

EXPLODED VIEW CABINET



BLOCK DIAGRAM



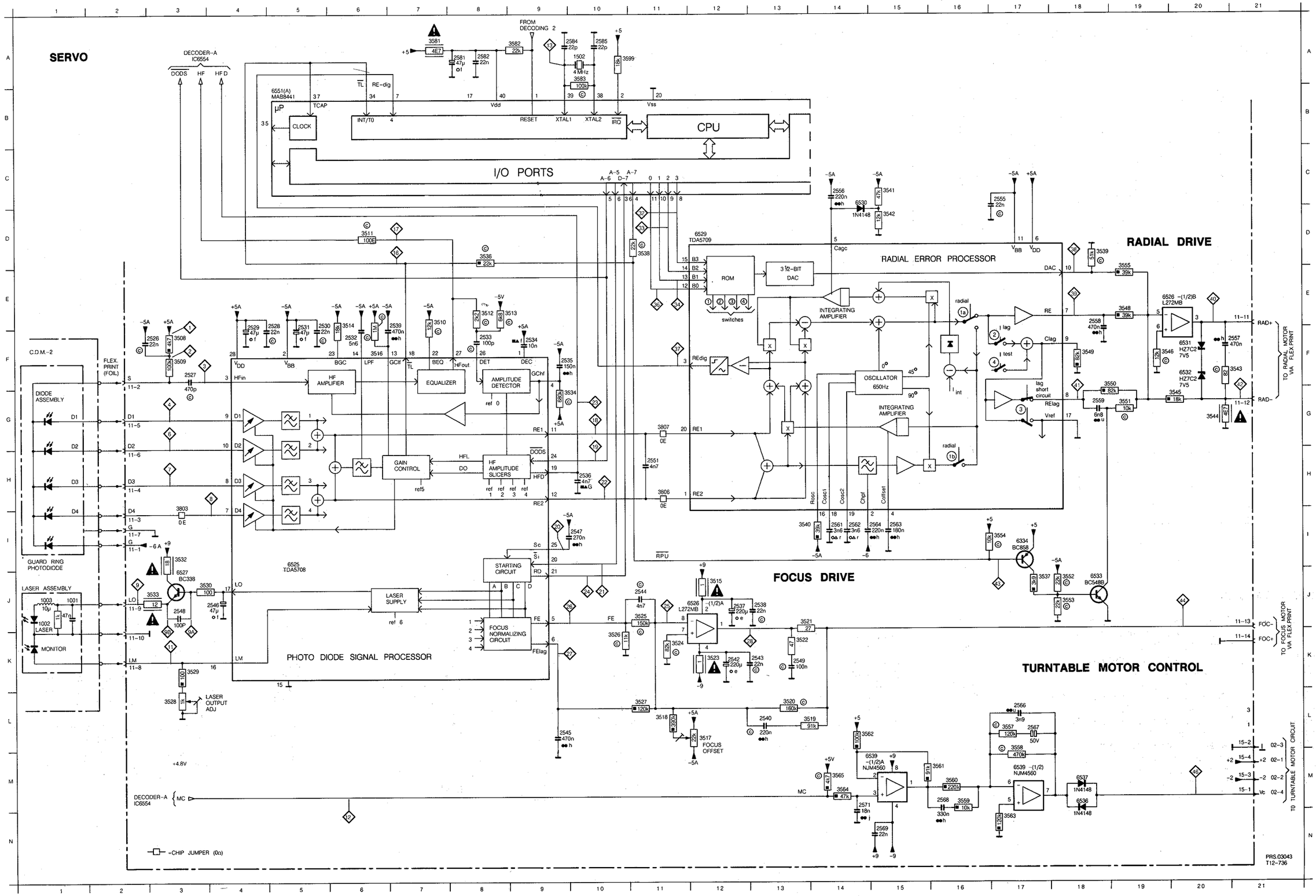
BLOCK DIAGRAM

B0-B3	-	Control bits for radial circuit
DAC	-	Current output for track jumping (Digital to Analogue Converted)
$\overline{\text{DODS}}$	-	Drop out detector supression
D1÷4	-	Photodiode currents
FE	-	Focus error signal
FE-lag	-	Focus error signal for LAG network
HF	-	HF output for DEMOD
HFD	-	HF detector output for DEMOD
HF-in	-	HF current input
LM	-	Laser monitor diode input
LO	-	laser amplifier current output
MC	-	Motor control signal
RE	-	Radial error signal (amplified RE_2-RE_1 currents)
RE1	-	Radial error signal 1 (summation of amplified currents D_3 and D_4
RE2	-	Radial error signal 2 (summation of amplified currents D_1 and D_2
RE dig	-	Radial error digital
RE lag	-	Radial error signal for LAG network
$\overline{\text{RPU}}$	-	Radial puls after track jumping
$\overline{\text{Si}}$	-	On/off control for laser supply and focus circuit
$\overline{\text{TL}}$	-	Track loss signal
Vc	-	Control voltage for turntable motor

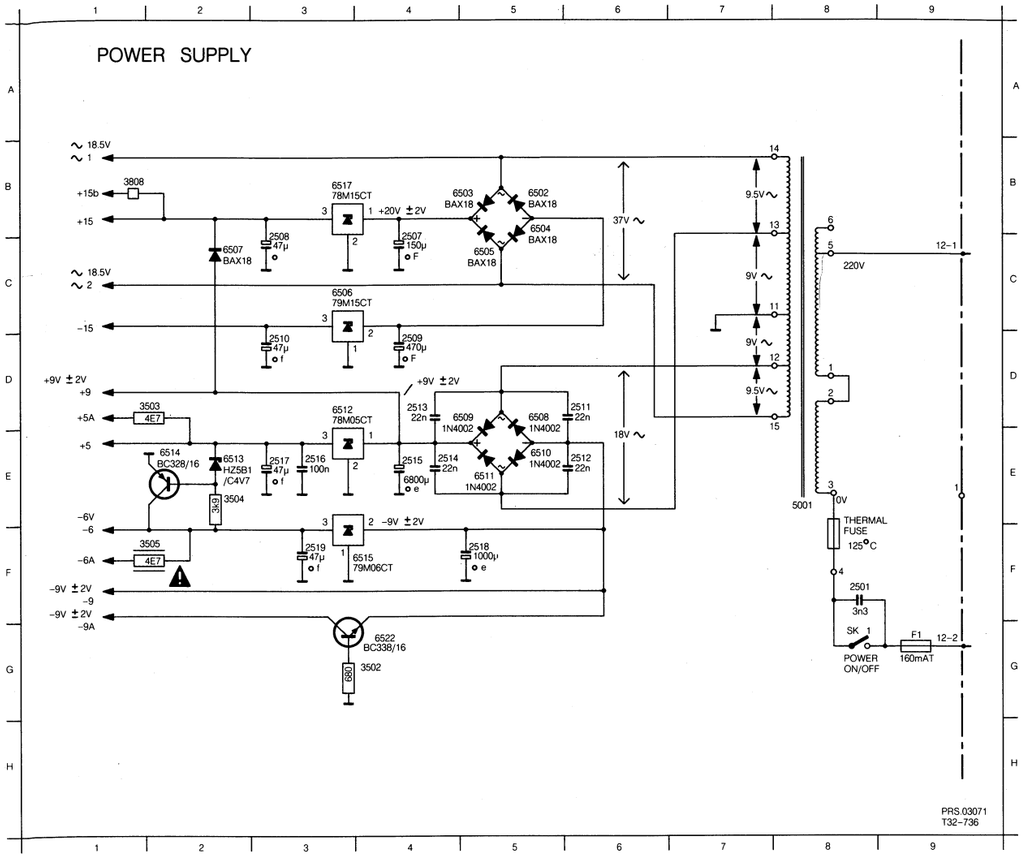
$\overline{\text{ATSB}}$	-	Attenuation of Audio level in Search position (Cueing)
CD ROM Switch	-	Digital Data information on disc signal
CEFM	-	Clock Eight-to-Fourteen Modulator
CLAB	-	Clock signal Decoder-A to Filter-B
$\overline{\text{CLBD}}$	-	Clock signal Filter-B to DAC
$\overline{\text{CRI}}$	-	Counter Reset Inhibit
DAAB	-	Data signal Decoder-A to Filter-B
$\overline{\text{DABD}}$	-	Clock signal Filter-B to DAC
$\overline{\text{DEEM}}$	-	Deemphasis
DOBM	-	Digital out signal
$\overline{\text{EFAB}}$	-	Error flag Decoder-A to Filter-B
$\overline{\text{MSTP}}$	-	Motor start-stop signal
$\overline{\text{MUTE}}$	-	Mute signal
	-	

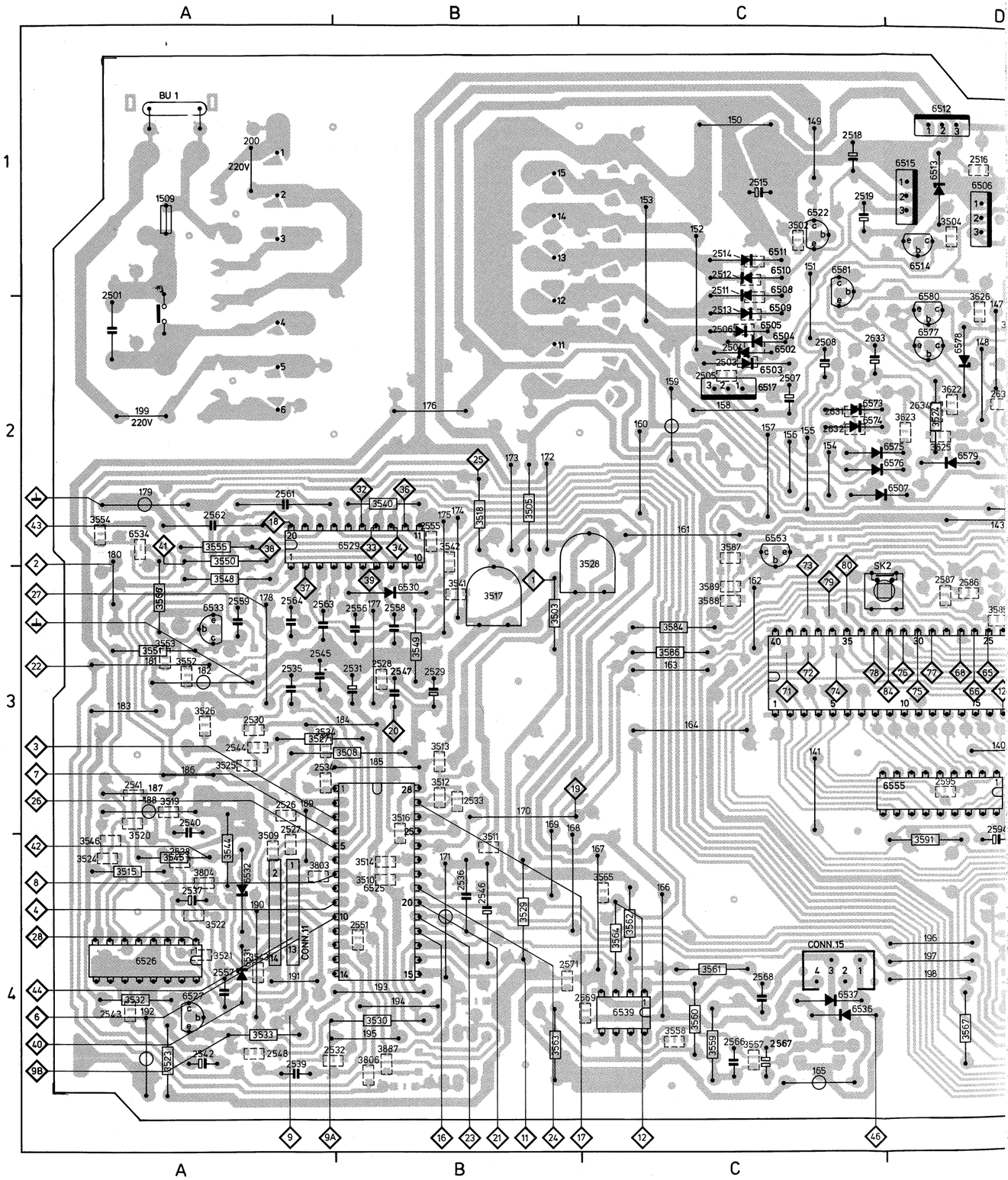
$\overline{\text{MUSB}}$	-	Soft Mute signal
QCL	-	Q-channel Clock signal
QDA	-	Q-channel Data signal
QRA	-	Q-channel Request Acknowledge
SCAB	-	Subcode clock Decoder-A to Filter-B
SDAB	-	Subcode data Decoder-A to Filter-B
SWAB/$\overline{\text{SSM}}$	-	Subcode Word/Start-stop motor signal
WSAB	-	Word Select Decoder-A to Filter-B
WSBD	-	Word Select Filter-B to DAC
XIN	-	Oscillator signal in Decoder-A
XSYS	-	Oscillator signal out Filter-B
A0-A7	-	Adressbus A0-A7

1001 J 1 2527 F 3 2532 F 6 2537 J12 2543 K13 2548 J 3 2557 F21 2563 I 15 2569 N15 2585 A10 3512 E 8 3517 L12 3522 K13 3527 L11 3533 J 3 3539 D18 3544 G20 3550 F19 3555 D19 3561 M16 3581 A 7 3806 H11 6526 J12 6532 F20 6539 M15
1002 J 1 2528 E 5 2533 F 8 2538 J13 2544 J11 2549 K13 2558 E18 2564 I 15 2571 M14 3508 F 3 3513 E 9 3518 L11 3523 K12 3528 L 3 3534 G10 3540 I 13 3545 G20 3551 G19 3557 L17 3562 L14 3582 A 9 3807 G11 6527 J 3 6533 J18 6551 B 5
1003 J 1 2529 E 4 2534 F 9 2539 E 7 2545 L 9 2551 H11 2559 G18 2565 L17 2581 A 8 3509 F 3 3514 E 6 3519 L13 3524 K11 3529 K 3 3536 D 8 3541 C15 3546 F20 3552 J18 3558 L17 3563 N17 3583 A10 6334 I 17 6529 D12 6536 M18
1502 A10 2530 E 5 2535 F10 2540 L13 2546 J 4 2555 C17 2561 I 14 2567 L17 2582 A 8 3510 E 7 3515 J12 3520 L13 3525 J11 3530 J 3 3537 J17 3542 D15 3548 E19 3553 J18 3559 M16 3564 M14 3599 A11 6525 I 5 6530 C14 6537 M18
2526 F 3 2531 E 5 2536 H10 2542 K12 2547 I 10 2556 C14 2562 I 14 2568 M16 2584 A10 3511 D 6 3516 F 6 3521 J13 3526 K10 3532 I 3 3538 D11 3543 F21 3549 F18 3554 I 17 3560 M16 3565 M14 3803 H 3 6526 E20 6531 F20 6539 M17



2501	F 8	2509	D 4	2512	E 6	2515	E 4	2518	F 5	3503	D 2	3808	B 1	6503	B 5	6506	C 3	6509	D 5	6512	D 3	6515	F 4	F1	G 9
2507	C 4	2510	D 3	2513	D 4	2516	E 3	2519	F 3	3504	E 2	5001	E 8	6504	B 5	6507	C 2	6510	E 5	6513	E 2	6517	B 3	SK1	G 8
2508	C 3	2511	D 6	2514	E 4	2517	E 3	3502	G 4	3505	F 2	6502	B 5	6505	C 5	6508	D 5	6511	E 5	6514	E 2	6522	G 4		





5 F 4 F1 G 9
7 B 3 SK1 G 8
2 G 4

9

A
B
C
D
E
F

1
2
3
4

12-1

12-2

F1
160mAT

PRS.03071
T32-736

BU 1

AUDIO OUT
BU2-L BU2-R

TO CONN.16

HEAD PHONE BU

CONN.15

CONN.16

CONN.17

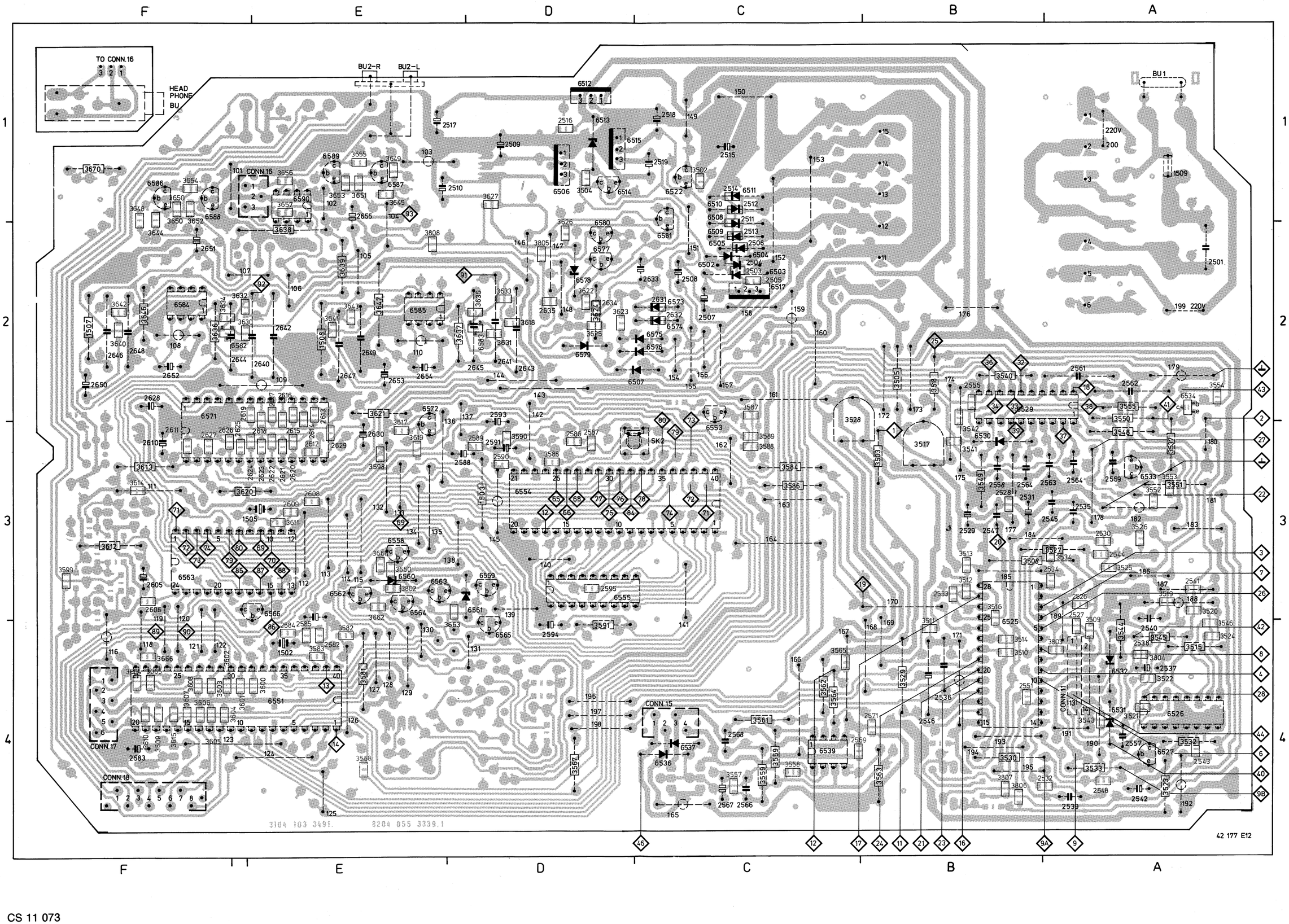
CONN.18

CONN.19

SK2

42 176 E12

CS 11 072



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3	A03	9	A04
4	A04	9A	A04
6	A04	9B	A04
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79	E03	87	E03
80	C03	88	E03
84	C03	89	F04
85	E03	90	F04

2537	A04	2543	A04
2538	A04	2544	A03
2540	A03	2545	A03
2541	A03	2546	B04
2542	A04	2547	B03
2617	E02	2623	E03
2619	E02	2624	E03
2620	E03	2625	E03
2621	E03	2626	E03
2622	E03	2627	F03
3520	A03	3525	A03
3521	A04	3526	A03
3522	A04	3527	A03
3523	A04	3528	C02
3524	A04	3529	B04
3590	D03	3601	E04
3591	D04	3602	F04
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3599	F03	3604	F04
3600	E04	3605	F04
3651	E01	3656	E01
3652	F01	3657	E01
3653	E01	3660	E03
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3655	E01	3663	D03
6553	C02	6560	E03
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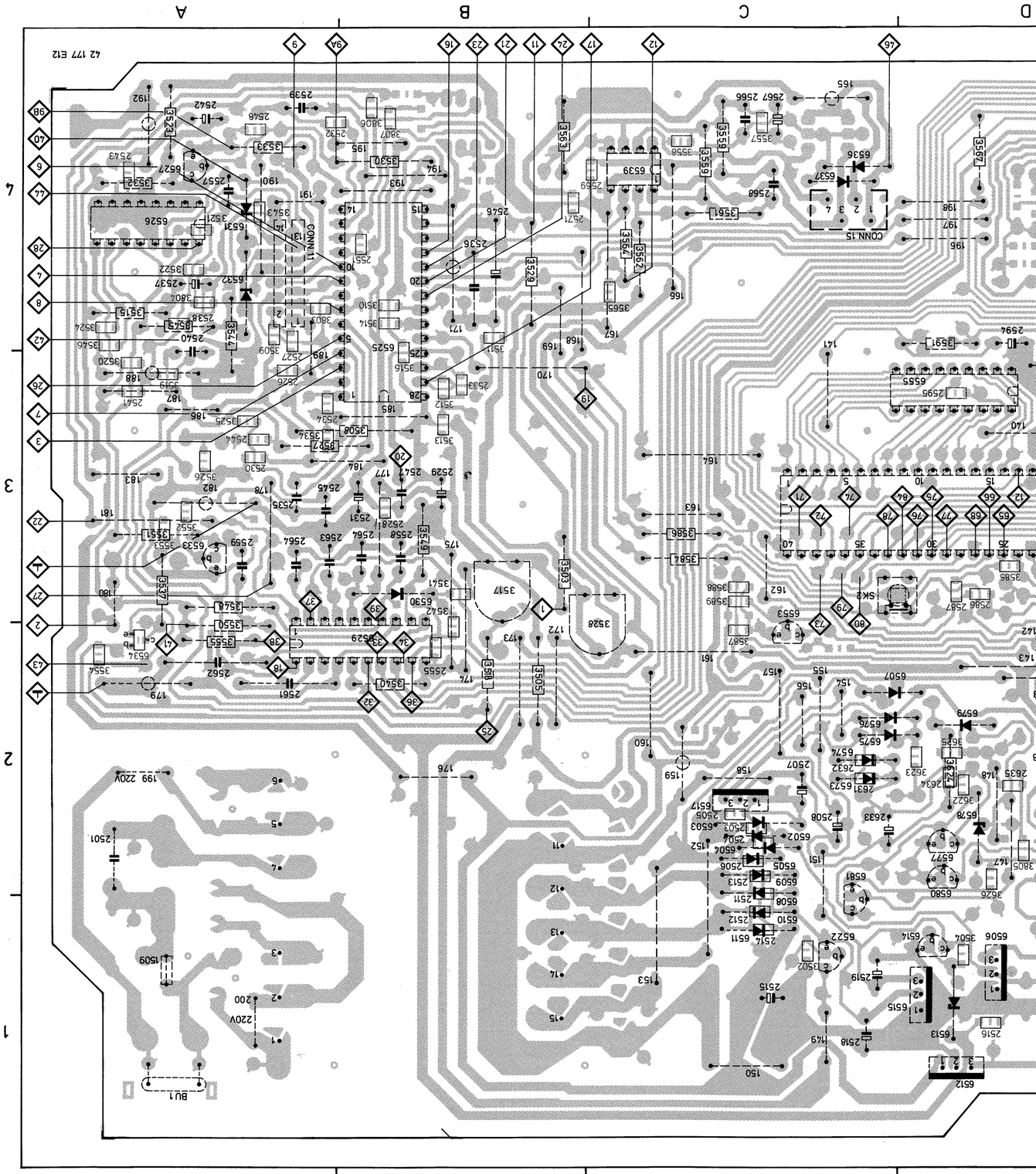

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3	A03	9	A04	13	E04	19	B03	24	B04	34	B02	40	A04	46	C04
4	A04	9A	A04	14	E04	20	B03	26	A04	36	B02	41	A02	65	D03
6	A04	9B	A04	16	B04	21	B04	28	A04	37	A03	42	A04	66	D03
78	C03	86	E03	92	E02	SK2	C03	1508	E02	2506	C02	2511	C02	2516	D01
79	E03	87	E03	93	E01	1502	E04	2501	A02	2507	C02	2512	C01	2517	E01
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84	C03	89	F04	BU2	E01	1505	E03	2504	C02	2509	D01	2514	C01	2519	C01
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2619	E02	2624	E03	2629	E03	2634	D02	2643	D02	2648	F02	2653	E02	3504	D01
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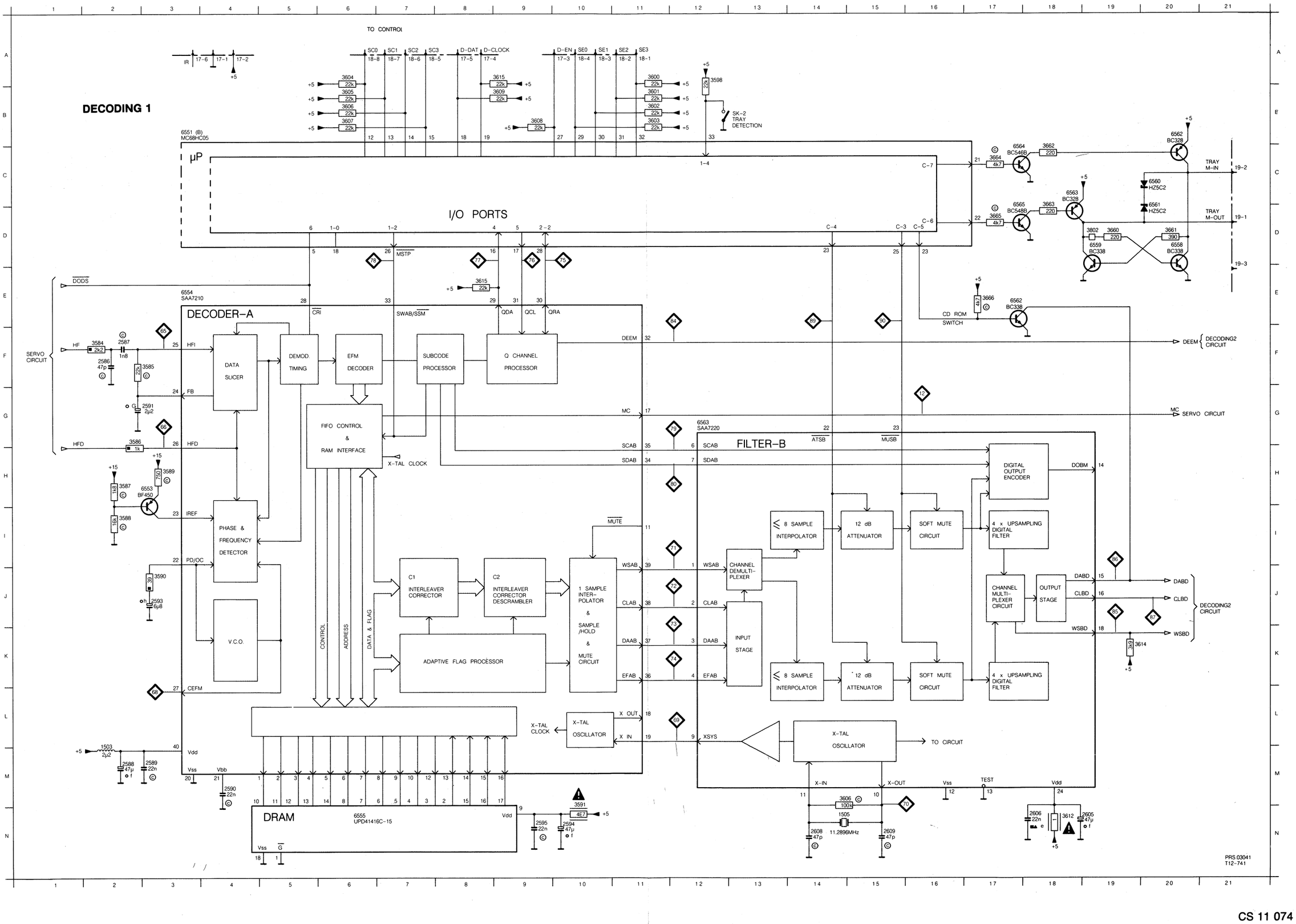
6558	E03	6563	F03	6573	C02	6578	D02	6584	F02	6589	E01				
6559	D03	6565	D04	6574	C02	6579	D02	6585	E02	6590	E01				

1503 L 2 1505 N14 2586 F 2 2587 F 2 2588 M 2 2589 M 3 2590 M 4 2591 G 3 2593 J 3 2594 N10 2595 N 9 2605 N19 2606 N18 2608 N14 2609 N15 3584 F 2 3585 F 3 3586 G 2 3587 H 2 3588 I 2 3589 H 3 3590 J 3 3591 M10 3598 A12 3600 A11 3601 B11 3602 B11 3603 B11 3604 A 6 3605 B 6 3606 M14 3606 B 6 3607 B 6 3608 B 9 3609 B 9 3612 N18 3614 K20 3615 E 8 3615 A 9 3660 D19 3661 D20 3662 C18 3663 C18 3664 C17 3665 D17 3666 E17 3802 D19 6551 B 3 6553 H 3 6554 E 3 6555 N 6 6558 D20 6559 D19 6560 C20 6561 C20 6562 E17 6562 B20 6563 G12 6563 C18 6564 C17 6565 C18 6565 C17 SK-2 B13



CS 11 074

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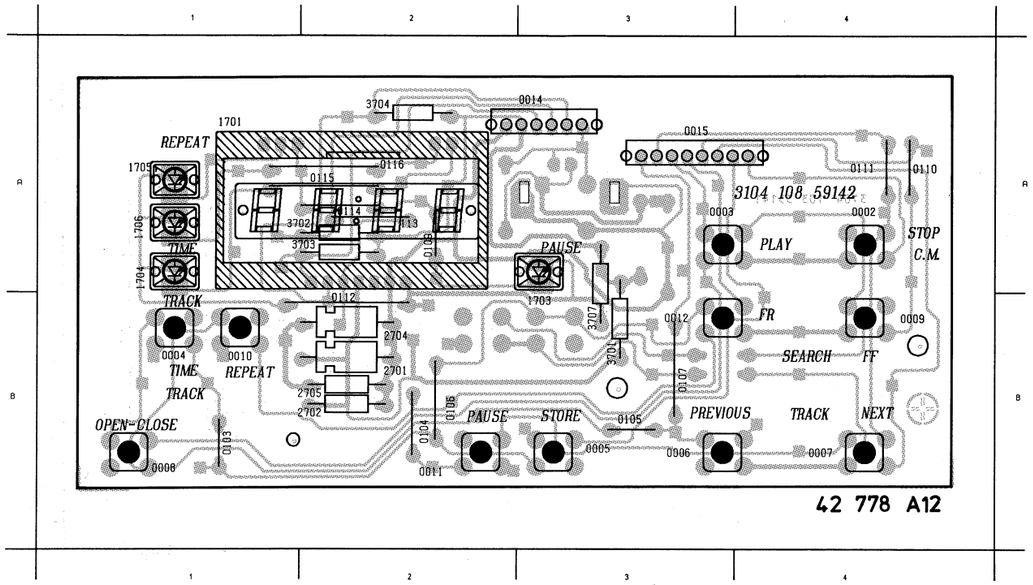

0002 A 4
0003 A 3
0004 B 1
0005 B 3
0006 B 3
0007 B 4
0008 B 1
0009 B 4
0010 B 1
0011 B 2
0012 B 3
0014 A 3
0015 A 3
1701 A 1
1703 B 3
1704 A 1
1705 A 1
1706 A 1
2701 B 2
2702 B 2
2704 B 2
2705 B 2
3701 B 3
3702 A 2
3703 A 1
3704 A 2
3707 B 3

PRS.03276
DRST. FRD
T12/742
BEH. BU 42778R

PRINCIPE DISPLAY

0002 H 2
0003 I 2
0004 J 2
0005 H 3
0006 H 5
0007 H 5
0008 H 2
0009 I 6
0010 H 6
0011 H 6
0012 J 6
0021 A 1
0023 F 1
0103 J 3
0104 I 6
0105 H 4
0106 J 3
0107 H 1
0109 D 9
0110 F 1
0111 I 1
0112 A10
0113 D 3
0114 D 8
0115 B 8
0116 C 8
1701 A 3
1703 D 9
1704 B 9
1705 C 9
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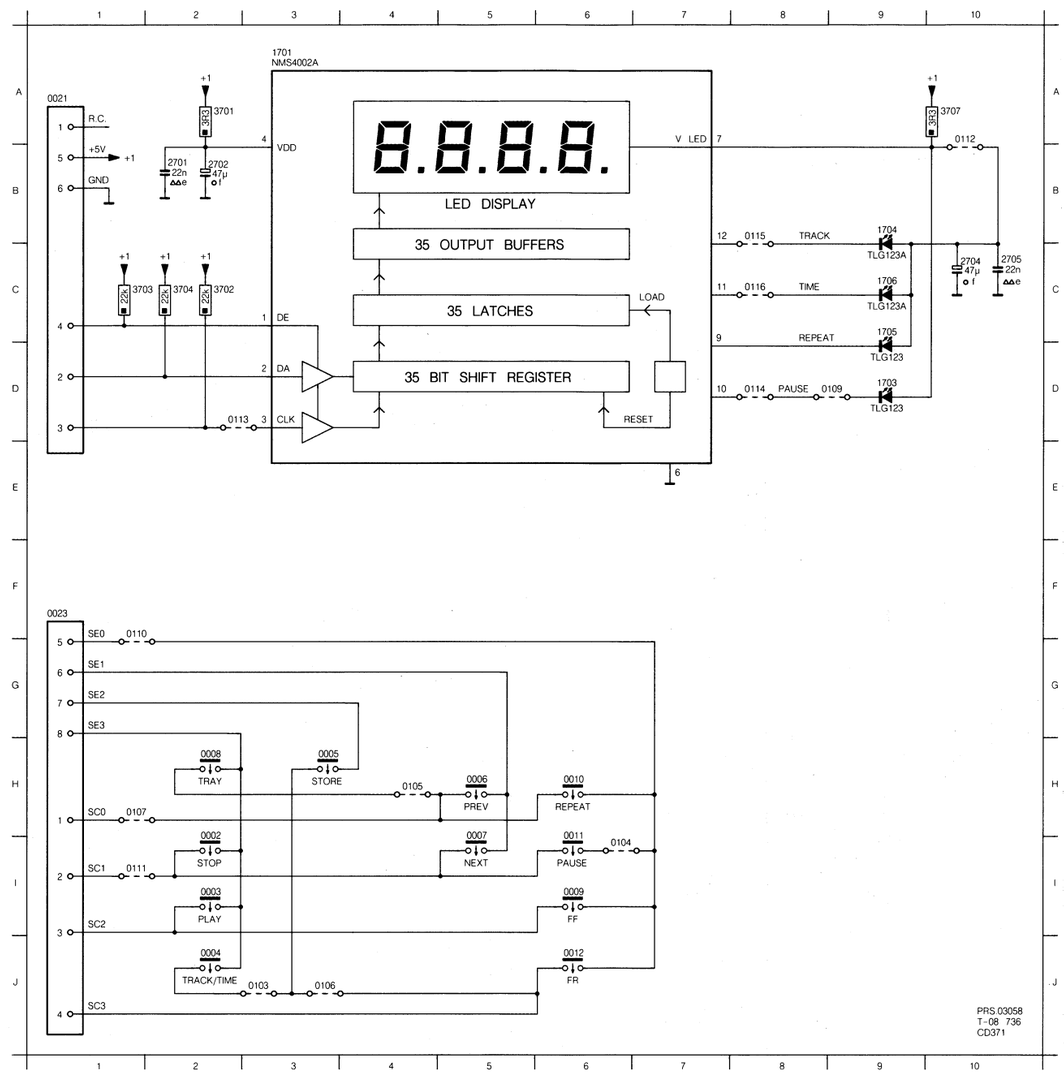
3704 C 2
3707 A10



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1508	D12	2614	B 6	2619	C 7	2624	H 7	2629	F 9	2640	I 11	2645	D11	2650	H14	2655	C14	3620	D 9	3625	F15	3631	E11	3636	H11	3641	C12	3646	H14	3651	D16	3656	G19	6573	E13	6578	F15	6583	E11	6586	H16	6591	D17
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2611	C 3	2616	B 7	2621	H 6	2626	H 7	2633	F14	2642	I 11	2647	C12	2652	H14	3617	J 9	3622	E15	3627	E17	3633	D11	3638	G14	3643	C12	3648	H15	3653	D16	3805	G16	6575	F13	6580	E16	6584	G13	6588	H16		
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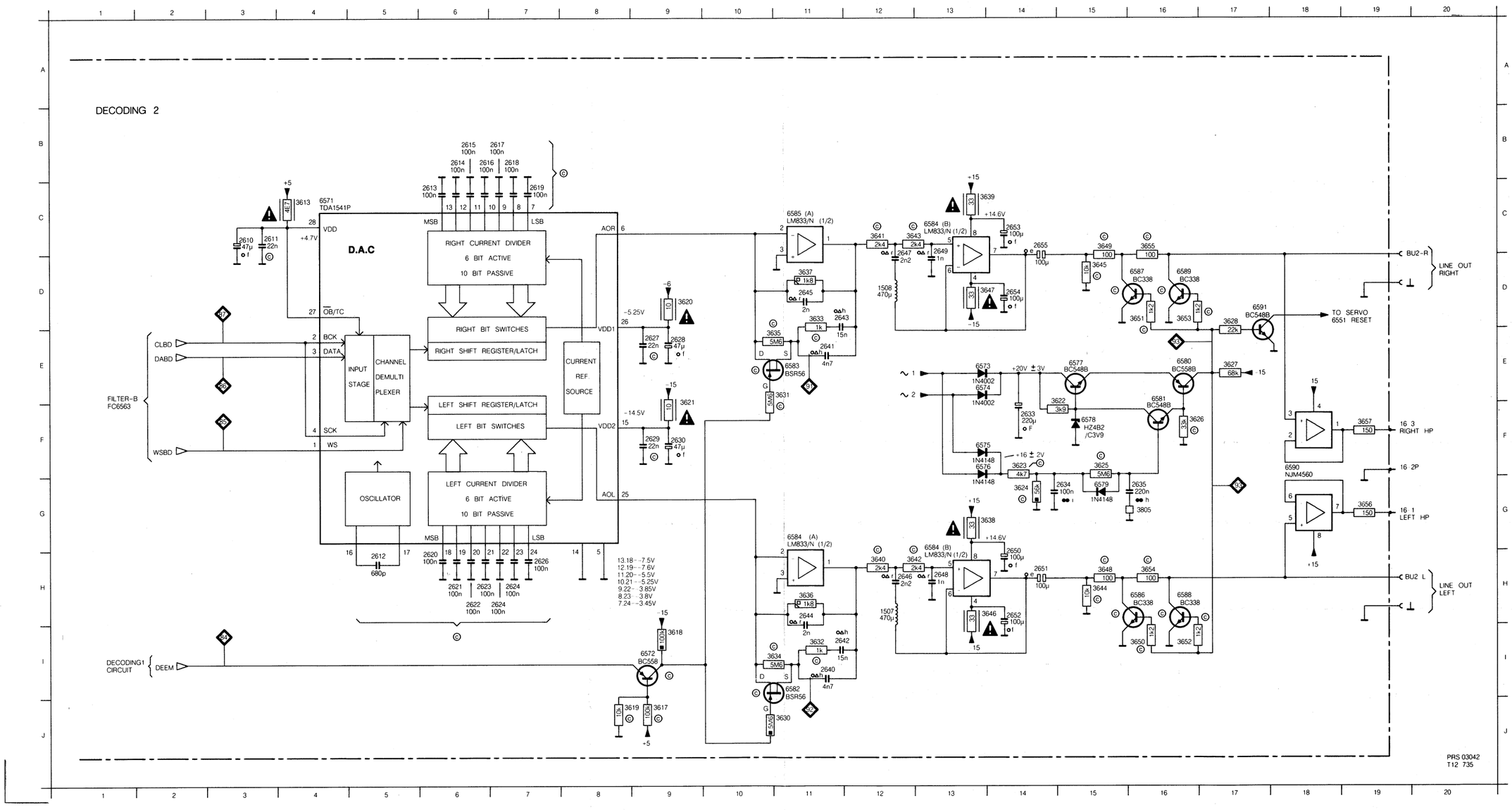
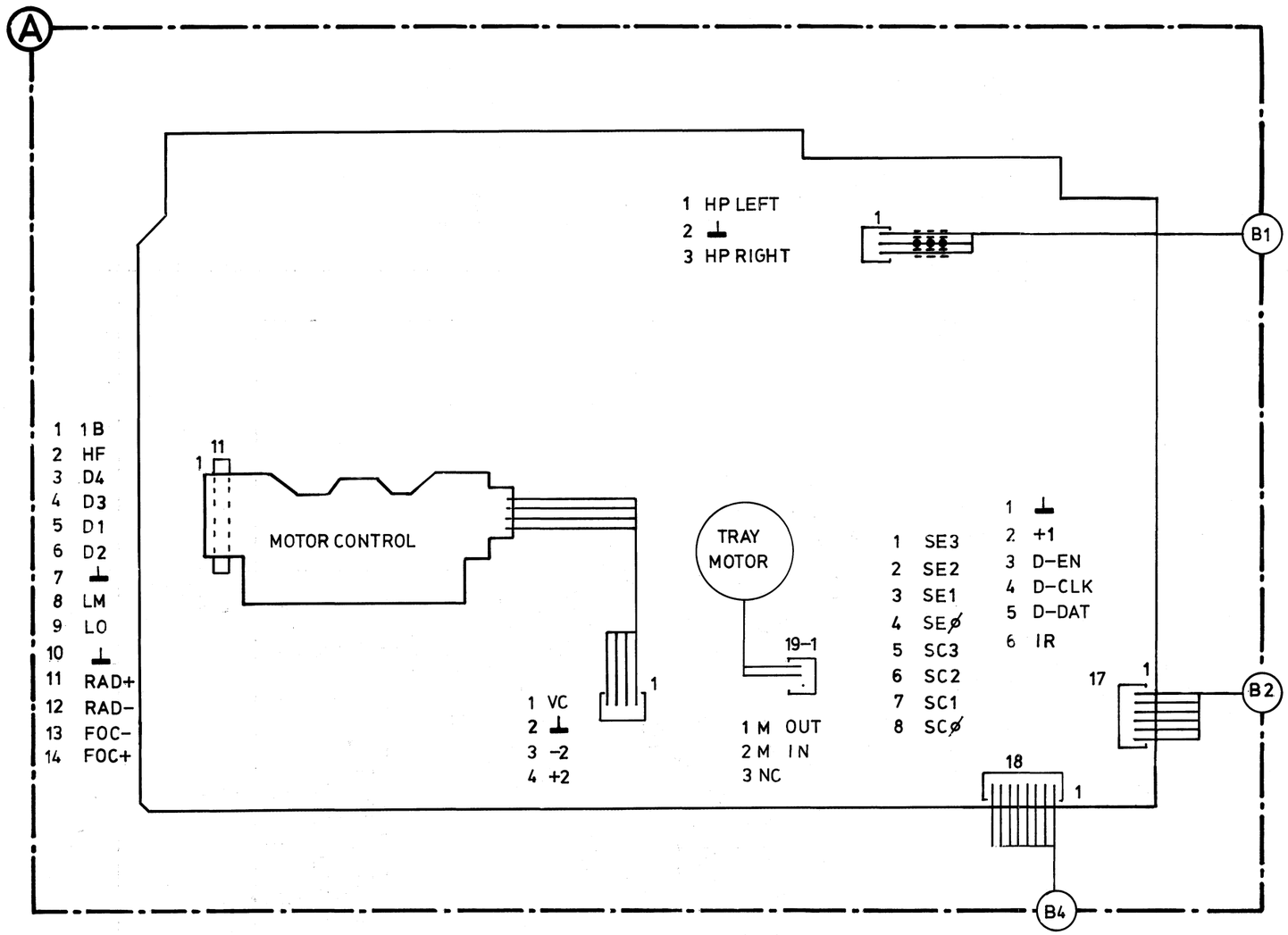
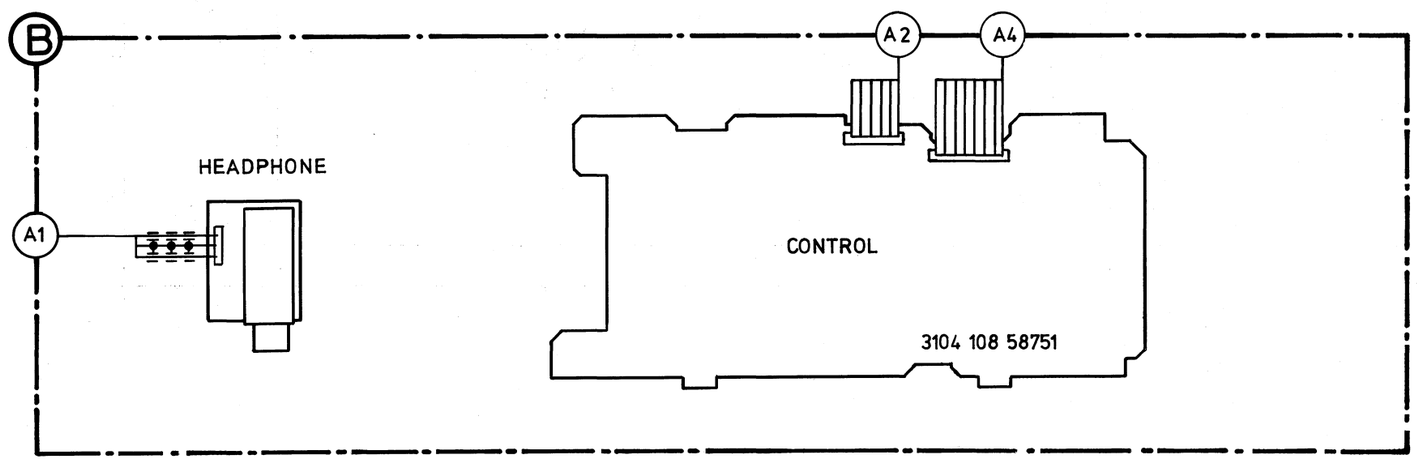
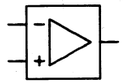
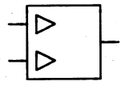
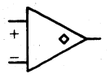
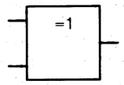
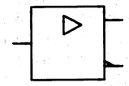
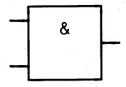
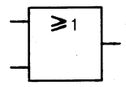
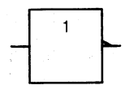
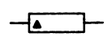
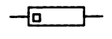
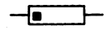
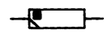
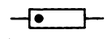
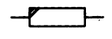
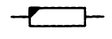


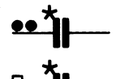
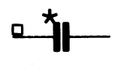
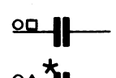
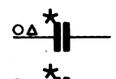
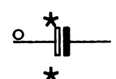
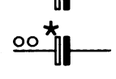

A
1 1B
2 HF
3 D4
4 D3
5 D1
6 D2
7 ⊥
8 LM
9 LO
10 ⊥
11 RAD+
12 RAD–
13 FOC–
14 FOC+
1 HP LEFT
2 ⊥
3 HP RIGHT
B1
MOTOR CONTROL
11
1
1 VC
2 ⊥
3 –2
4 +2
TRAY MOTOR
19–1
1 M OUT
2 M IN
3 NC
1 SE3
2 SE2
3 SE1
4 SEø
5 SC3
6 SC2
7 SC1
8 SCø
1 ⊥
2 +1
3 D–EN
4 D–CLK
5 D–DAT
6 IR
17
B2
18
B4


B
A2
A4
HEADPHONE
A1
CONTROL
3104 108 58751

42 470 D12

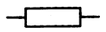
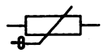
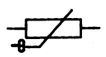
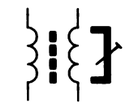
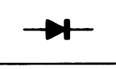
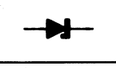
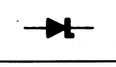
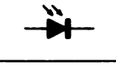
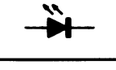
SYMBOL	DESCRIPTION
	Operational amplifier
	Differential amplifier
	Splitter
	Operational amplifier with open output
	Exclusive OR gate
	True/complement amplifier with high input
	Flip Flop
	AND gate
	OR gate
	Inverter with high input

	0.2W (CR 16)	≤ 220kΩ > 270kΩ	5% 10%
	0.33W (CR 25)	≤ 1MΩ > 1MΩ	5% 10%
	0.33W (SFR25)		5%
	0.25W (VR 25)	≤ 10MΩ > 10MΩ	.5% 10%
	0.5W (CR 37)	≤ 1MΩ > 1MΩ	5% 10%
	0.67W (CR 52)		5%
	1.15W (CR 68)		5%

	Ceramic plate
	Polyester flat foil
	Polyester mepolesco
	Mylar (Polyester flat foil small sized)
	Micropoco
	Tubular ceramic (body colour pink or yellow/green)
	Miniature single elco
	Subminiature tantalum

* a=2,5V
b=4V
c=6,3V
d=10V
e=16V
f=25V
g=40V
h=63V
i=100V
j=125V
l=125V
m=150V
n=160V
q=200V
r=250V
s=300V
t=350V
u=400V
v=500V
w=630V
x=1000V
A=1.6V
B=6V
C=12V
D=15V
E=20V
F=35V
G=50V
H=75V
I=80V

MDA.00084
T32–735

SYMBOL	DESCRIPTION
	Capacitor, general
	Electrolytic capacitor (+ and – may be omitted)
	Bipolar electrolytic capacitor (+ may be omitted)
	Resistor, general
	N.T.C. resistor
	P.T.C. resistor
	Voltage divider with preset adjustment
	Chip jumper
	Pin contact
	Bus contact
	Coil, self–induction
	Transformer with electrically poor conducting core and adjustable pre–magnetization
	Diode
	Zener diode
	Stabistor
	Double variable capacity diode (in one envelope)
	Photo conductive diode
	L.E.D.

SYMBOL	DESCRIPTION
	Transistor (N.P.N.)
	Transistor (P.N.P.)
	Direct current (DC)
	Alternating current (AC)
	Earth (functional)
	Frame or chassis connection
	Direction in which AC voltages are passed on (optional present)
	Interrupted line
	Not–connected crossing lines
	Connected lines
	Cable tree with lead–outs
	Changer, general (arrow is optional)
	G VCO — Voltage Controlled Oscillator
	Band–pass filter
	Phase changing network
	...ns — Delay element
	Amplifier, general

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SUPPLY + DECODER
For non active chip components see separate list

MC79M15CT	5322 209 86361
MC7906CT	4822 209 82056
TY40408 (+5 V)	4822 209 71579
MC78M15	4822 209 80808
TDA5708/C3	4822 209 83202
TDA5709	4822 209 83203
SAA7210P/04	4822 209 71001
µPD41416C-20	4822 209 50582
SAA7220	4822 209 11157
TDA1541/N5	4822 209 70295
LM833	4822 209 72031
NJM4560D	4822 209 83274
L272BH	4822 209 72026
MC68HC05C4	482 2209 72236
MM58348	4822 209 72122

BC328-16	4822 130 41023
BC328	4822 130 44104
BC338	4822 130 44121
BC548B	4822 130 40937
BC548C	4822 130 44196
BC558B	4822 130 44197
BC858B	5322 130 41983
BF450	4822 130 44237
BSR56	4822 130 42633

-Miscellaneous-

Display	4822 130 90474
Cinch socket	4822 267 40766
Tackt switch (for main panel)	4822 276 11276
Mains switch	4822 276 11309
Mains inlet	4822 265 20291
Transformer, mains	4822 146 30623

BAX18	4822 130 34121
1N4002	5322 130 30684
1N4148	4822 130 30621
HZ5B1/4V7	4822 130 32986
HZ5C2 5V1	4822 130 33293
HZ7C2/7V5	4822 130 32862
BZV85 C6V2	5322 130 32962
LED	5322 130 34957

CSA4.000MG	4822 157 51193
11289.6 kHz	4822 242 71644

Coil 470 µH	4822 157 51193

Bip 2M2 50 V	4822 124 22341
Bip 100M 16 V	4822 124 22339

1R	4822 111 30483
4R7	4822 111 30499
10R	4822 111 30508
12R	4822 111 30511
18R	4822 111 30515
33R	4822 111 30522
1K8	4822 116 53104

3517	22K	4822 100 20522
3528	1K	4822 100 10874

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1 pF	5%	4822 122 32479
1,5 pF	5%	4822 122 31792
1,8 pF	5%	4822 122 32087
2,2 pF	5%	4822 122 32425
3,3 pF	5%	4822 122 32079
3,9 pF	5%	4822 122 32081
4,7 pF	5%	4822 122 32082
5,6 pF	5%	4822 122 32506
6,8 pF	5%	4822 122 32507
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
12 pF	5%	4822 122 32139
15 pF	5%	4822 122 32504
18 pF	5%	4822 122 31769
22 pF	10%	4822 122 31837
27 pF	5%	4822 122 31966
33 pF	5%	4822 122 31756
39 pF	5%	4822 122 31972
47 pF	5%	4822 122 31772
56 pF	5%	4822 122 31774
68 pF	5%	4822 122 31961
82 pF	10%	4822 122 31839
100 pF	5%	4822 122 31765
120 pF	5%	4822 122 31766
150 pF	5%	4822 122 31767
180 pF	2%	4822 122 31794
220 pF	5%	4822 122 31965
270 pF	5%	4822 122 32142
330 pF	10%	4822 122 31642
390 pF	5%	4822 122 31771
470 pF	5%	4822 122 31727
560 pF	5%	4822 122 31773
680 pF	5%	4822 122 31775
820 pF	5%	4822 122 31974
1 nF	10%	5322 122 31647
1,2 nF	5%	4822 122 31807
1,5 nF	10%	4822 122 31781
1,8 nF	10%	4822 122 32153
2,2 nF	10%	4822 122 31644
2,7 nF	10%	4822 122 31783
3,3 nF	10%	4822 122 31969
3,9 nF	10%	4822 122 32566
4,7 nF	10%	4822 122 31784
5,6 nF	10%	4822 122 31916
6,8 nF	10%	4822 122 31976
10 nF	10%	4822 122 31728
12 nF	10%	5322 122 31648
15 nF	10%	4822 122 31782
18 nF	10%	4822 122 31759
22 nF	10%	4822 122 31797
27 nF	10%	4822 122 32541
33 nF	10%	4822 122 31981
47 nF	10%	4822 122 32542
56 nF	10%	4822 122 32183
100 nF	10%	4822 122 31947
180 nF	10%	4822 122 32915
220 nF	20%	4822 122 32715

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0 E	jumper	4822 111 90163
1 E	5%	4822 111 90184
1,1 E	5%	4822 111 90377
1,2 E	5%	4822 111 90378
1,3 E	5%	4822 111 90379
1,5 E	5%	4822 111 90381
1,6 E	5%	4822 111 90382
1,8 E	5%	4822 111 90383
2 E	5%	4822 111 90384
2,2 E	5%	5322 111 90104
2,4 E	5%	4822 111 90385
2,7 E	5%	4822 111 90386
3 E	5%	4822 111 90387
3,3 E	5%	4822 111 90388
3,6 E	5%	4822 111 90389
3,9 E	5%	4822 111 90391
4,3 E	5%	4822 111 90392

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4,7 E	5%	5322 111 90376
5,1 E	5%	4822 111 90393
5,6 E	5%	4822 111 90394
6,2 E	5%	4822 111 90395
6,8 E	5%	4822 111 90254
7,5 E	5%	4822 111 90396
8,2 E	5%	4822 111 90397
9,1 E	5%	4822 111 90398
10 E	2%	5322 111 90095
11 E	2%	4822 111 90338
12 E	2%	4822 111 90341
13 E	2%	4822 111 90343
15 E	2%	4822 111 90344
16 E	2%	4822 111 90347
18 E	2%	5322 111 90139
20 E	2%	4822 111 90352
22 E	2%	4822 111 90186
24 E	2%	4822 111 90355
27 E	2%	5322 111 90105
30 E	2%	4822 111 90356
33 E	2%	4822 111 90357
36 E	2%	4822 111 90359
39 E	2%	4822 111 90361
43 E	2%	5322 116 90125
47 E	2%	4822 111 90217
51 E	2%	4822 111 90365
56 E	2%	4822 111 90239
62 E	2%	4822 111 90367
68 E	2%	4822 111 90203
75 E	2%	4822 111 90371
82 E	2%	4822 111 90124
91 E	2%	4822 111 90375
100 E	2%	5322 111 90091
110 E	2%	4822 111 90335
120 E	2%	4822 111 90339
130 E	2%	4822 111 90164
150 E	2%	5322 111 90098
160 E	2%	4822 111 90345
180 E	2%	5322 111 90242
200 E	2%	4822 111 90348
220 E	2%	4822 111 90178
240 E	2%	4822 111 90353
270 E	2%	4822 111 90154
300 E	2%	4822 111 90156
330 E	2%	5322 111 90106
360 E	1%	4822 111 90288
360 E	2%	4822 111 90358
390 E	2%	5322 111 90138
430 E	2%	4822 111 90362
470 E	2%	5322 111 90109
510 E	2%	4822 111 90245
560 E	2%	5322 111 90113
620 E	2%	4822 111 90366
680 E	2%	4822 111 90162
750 E	2%	5322 111 90306
820 E	2%	4822 111 90171
910 E	2%	4822 111 90372
1 k	2%	5322 111 90092
1,1 k	2%	4822 111 90336
1,2 k	2%	5322 111 90096
1,3 k	2%	4822 111 90244
1,5 k	2%	4822 111 90151
1,6 k	2%	5322 111 90265
1,8 k	2%	5322 111 90101
2 k	2%	4822 111 90165
2,2 k	2%	4822 111 90248
2,4 k	2%	4822 111 90289
2,7 k	2%	4822 111 90569
3 k	2%	4822 111 90198
3,3 k	2%	4822 111 90157
3,6 k	2%	5322 111 90107
3,9 k	2%	4822 111 90571
4,3 k	2%	4822 111 90167
4,7 k	2%	5322 111 90111
5,1 k	2%	5322 111 90268
5,6 k	2%	4822 111 90572
6,2 k	2%	4822 111 90545

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6,8 k	2%	4822 111 90544
7,5 k	2%	4822 111 90276
8,2 k	2%	5322 111 90118
9,1 k	2%	4822 111 90373
10 k	2%	4822 111 90249
11 k	2%	4822 111 90337
12 k	2%	4822 111 90253
13 k	2%	4822 111 90509
15 k	2%	4822 111 90196
16 k	2%	4822 111 90346
18 k	2%	4822 111 90238
20 k	2%	4822 111 90349
22 k	2%	4822 111 90251
24 k	2%	4822 111 90512
27 k	2%	4822 111 90542
30 k	2%	4822 111 90216
33 k	2%	5322 111 90267
36 k	2%	4822 111 90514
39 k	2%	5322 111 90108
43 k	2%	4822 111 90363
47 k	2%	4822 111 90543
51 k	2%	5322 111 90274
56 k	2%	4822 111 90573
62 k	2%	5322 111 90275
68 k	2%	4822 111 90202
75 k	2%	4822 111 90574
82 k	2%	4822 111 90575
91 k	2%	5322 111 90277
100 k	2%	4822 111 90214
110 k	2%	5322 111 90269
120 k	2%	4822 111 90568
130 k	2%	4822 111 90511
150 k	2%	5322 111 90099
160 k	2%	5322 111 90264
180 k	2%	4822 111 90565
200 k	2%	4822 111 90351
220 k	2%	4822 111 90197
240 k	2%	4822 111 90215
270 k	2%	4822 111 90302
300 k	2%	5322 111 90266
330 k	2%	4822 111 90513
360 k	2%	4822 111 90515
390 k	2%	4822 111 90182
430 k	2%	4822 111 90168
470 k	2%	4822 111 90161
510 k	2%	4822 111 90364
560 k	2%	4822 111 90169
620 k	2%	4822 111 90213
680 k	2%	4822 111 90368
750 k	2%	4822 111 90369
820 k	2%	4822 111 90205
910 k	2%	4822 111 90374
1 M	2%	4822 111 90252
1,1 M	5%	4822 111 90408
1,2 M	5%	4822 111 90409
1,3 M	5%	4822 111 90411
1,5 M	5%	4822 111 90412
1,6 M	5%	4822 111 90413
1,8 M	5%	4822 111 90414
2 M	5%	4822 111 90415
2,2 M	5%	4822 111 90185
2,4 M	5%	4822 111 90416
2,7 M	5%	4822 111 90417
3 M	5%	4822 111 90418
3,3 M	5%	4822 111 90191
3,6 M	5%	4822 111 90419
3,9 M	5%	4822 111 90421
4,3 M	5%	4822 111 90422
4,7 M	5%	4822 111 90423
5,1 M	5%	4822 111 90424
5,6 M	5%	4822 111 90425
6,2 M	5%	4822 111 90426
6,8 M	5%	4822 111 90235
7,5 M	5%	4822 111 90427
8,2 M	5%	4822 111 90237
9,1 M	5%	4822 111 90428
10M	5%	5322 111 91141